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T. N. KELYNACK, M.D.

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SYMPOSIUM.

ARTIFICIAL PNEUMOTHORAX IN THE TREATMENT OF PULMONARY TUBERCULOSIS.

ARTIFICIAL pneumothorax, although long advocated and employed by a few medical advisers in this country, has made but slow progress as an approved method for the carrying out of collapse-therapy in cases of pulmonary tuberculosis. The time has now come when a statement regarding the experience and opinion of those who have practised artificial pneumothorax seems desirable. With the kind co-operation of a number of well-known experts we are enabled to present the following Symposium.

FROM SIR PERCIVAL HORTON-SMITH HARTLEY,

C.V.O., M.A., M.D., F.R.C.P.,

Physician and Joint Lecturer in Medicine, St. Bartholomew's Hospital; Consulting Physician to Brompton Consumption Hospital; Joint Author of "Diseases of Lungs and Pleura."

The treatment of selected cases of pulmonary tuberculosis by means of collapse of the lung, thus giving rest to the diseased organ, is not of very recent origin, having been introduced in 1888 by Professor Forlanini of Pavia. The method, however, was not perfected and rendered safe until nearly twenty years later, when Professor Brauer, of Hamburg, added the water-manometer to the necessary apparatus. In England the method was not employed before 1911, and its increasing use since has testified to its great value in the treatment of certain cases of phthisis: indeed it may be regarded as the greatest advance which has been made in tuberculosis therapy since the introduction of the sanatorium regime. The treatment may be initiated

anywhere, but, if circumstances permit, it is best carried out at a sanatorium, since for the first four or five weeks, during the initial refills, rest in bed is desirable, and this under good conditions is as a rule most easily and most cheaply obtained in such an institution. If performed in a hospital the patient should be drafted to a sanatorium as soon as a bed is available. The treatment was slow in obtaining general recognition on account, perhaps of the danger of *gas-embolism*, which until the introduction of the manometer—with the certainty which it gave that the needle was actually in the pleural cavity—could not be eliminated. This danger, if proper care be taken, both at the initial operation and at the refills, may now be regarded as negligible. The danger of *pleural shock* is also so slight that it need never deter us from this method of treatment, provided it be otherwise indicated. Two *complications*, however, even when all care is taken, are liable to occur during the course of treatment: one rare, but grave; the other frequent, but of less serious moment. The former consists in *perforation (into the pneumothorax cavity) of the visceral pleura*, now separated from the parietal and unprotected. This complication may result from extension of the lung disease, or from a tear in the pleura following too great exertion. In either case septic pyo-pneumothorax is apt to follow, with all its grave consequences. Fortunately, however, contrary to what might be expected, this complication is infinitely rare, and dread of it should not negative the treatment. The other complication, *pleurisy with effusion*, is much more common. It occurs, indeed, at some period during the treatment in nearly half the cases, and is more common in cases in which the pulmonary tuberculosis is running an acute course. The fluid may be small in amount—a mere "puddle," if we may use the term, at the bottom of the pneumothorax cavity, and detected only by succussion (which should always be practised from time to time in cases under treatment), and may be soon spontaneously absorbed. In other cases the fluid gradually fills the chest, starting in quiescent manner, or in some cases acutely, like an acute pleurisy with effusion, which, in fact, it is. After one or two air-replacements the fluid may cease to reaccumulate, and the patient is none the worse for the complication. In a smaller proportion of cases the fluid recurs, and gradually becomes purulent, sterile on cultivation, but containing numerous tubercle bacilli. In such cases, after perhaps one or two ineffectual replacements with air, it is wise to stop the treatment. The possibility that pleurisy may complicate the treatment should be explained to the patient and his friends beforehand, as should also the lengthy nature of the treatment—possibly lasting for two to four years if all goes well. But these factors should not deter us in advising collapse therapy, if the case is a suitable one, and the patient not making progress on ordinary lines. *In what cases, then, is*

the treatment indicated? In the first place those with grave and repeated hæmoptysis (probably from a pulmonary aneurism), in which the physician can be certain from which side the blood is coming. The collapse of the lung induced often checks the hæmoptysis, and saves the patient from imminent risk of death. Those cases, again, are suitable in which the disease is largely limited to one lung, and in which the disease is progressing in spite of treatment on more ordinary lines. In such cases the patient often soon commences to improve; the cough and sputum lessen; and the temperature, if raised, drops gradually to normal, and convalescence is established. A limited amount of disease in the other so-called "healthy lung" should not deter us from giving the treatment a trial. If, after a few weeks, no improvement is being obtained, the refills may be discontinued, and the air within the pleura will soon be reabsorbed. Further than this, treatment by artificial pneumothorax sometimes produces remarkable results in cases of acute pulmonary tubercle of the caseous type, known formerly as "galloping consumption." In such cases, doomed, so far as the physician can say, to death within a few months, we have known in more than one case, when treatment has been commenced early, the continuous high fever to yield slowly to the increasing collapse, and the patient gradually to recover health and strength. But, as in all cases of phthisis, it is *arrest, not cure*, of the disease which is obtained, and the ultimate prognosis will depend on the patient's circumstances, and his ability and *will* to continue for very long the lines of sanatorium life, modified perhaps to some extent, in which he has been trained. In conclusion, in order to avoid undue disappointment, the patient should always be warned that, though his case is a suitable one for the treatment, the attempt to carry it out may prove impossible, owing to the presence of firm and widespread adhesions.

FROM CLIVE RIVIERE,

M.D., F.R.C.P.,

Physician City of London Hospital for Diseases of the Chest, Victoria Park; Author of "The Early Diagnosis of Tubercle" and "Pneumothorax Treatment of Pulmonary Tuberculosis."

Artificial pneumothorax is now just over forty years old, and is coming more and more into its own, as is shown by the strong position it now holds in the chest hospitals and sanatoria of this country. At the time of appearance of the first edition of the writer's text-book on "The Pneumothorax Treatment of Pulmonary Tuberculosis" in 1917 but little interest could be roused, and but few in England were practising the treatment. All this is changed, but we are a conservative

people, and it is surprising to find that there are still towns with populations of a quarter of a million and more where no one appears qualified to give a pneumothorax refill. This must mean that in those centres many die of pulmonary tuberculosis whose lives could have been saved, and this is a serious consideration. The Continent appears to be somewhat less backward. A French writer could remark with regard to this treatment in 1922, "Il n'est plus besoin de plaider pour elle." There they appear to accept the dictum that "in phthisiology artificial pneumothorax is the greatest discovery since the institution of the hygienic cure by Brehmer." Further, it has been remarked, "It is only a step from artificial pneumothorax to thoracoplasty; the one conducts inevitably to the other," and with this the writer agrees. Let us, then, open our minds to the great value of these operations, artificial pneumothorax and thoracoplasty, and realize that by their aid many lives can nowadays be saved which in the past were necessarily forfeit. The writer, looking back over a wide and varied experience, can still quote with confidence the opening sentence of his 1917 text-book: "No more hopeful ray of sunshine has ever come to illumine the dark kingdoms of disease than that introduced into the path of the consumptive through the discovery of artificial pneumothorax."

FROM S. VERE PEARSON,

M.D. (CAMB.), M.R.C.P. (LOND.),

Resident Physician, Mundesley Sanatorium, Norfolk.

Artificial pneumothorax has now been practised in England for seventeen years. Its position as a useful method of treatment under certain circumstances has become well established and its technique is now well understood. Overworked superintendents at public sanatoria with inadequate assistance through paucity of staff use the treatment, in spite of its entailing a good deal of extra work, because they realize that by its means health can often be more readily restored, and some lives, otherwise doomed, can be saved. Like all advances in treatment, a good deal depends upon an appropriate choice of patient and the proper management of details. Choice of patient is usually successfully made, largely because that matter is in the hands of medical advisers with expert knowledge, though probably the tendency is still to show too much diffidence in resorting to artificial pneumothorax. The same can be said about the management of the necessary procedures in the early stages. But there is some lack of a proper management of the case in the later stages, because this often has to be handed over to a doctor who has not acquired any special knowledge or

experience. It is a pity that more general practitioners now having access to X-ray equipment do not train themselves in the principles of this method of treatment. It would then be easier than it is at present to find a doctor who can effectively continue the refills after a patient leaves the expert supervision obtained in a sanatorium. Practice in recent years has brought out the fact that a successful result can generally be obtained with considerably lower pressures than were at one time considered necessary. Also the work of James Lawson, Peter Edwards and others has shown that notice must be taken when reading the manometric pressures of the position of the patient (whether upright, lying on the back or opposite side) when giving refills. Knowledge of the physics and physiology of the chest has undoubtedly been amplified through experience gained by collapse therapy. I still favour employment of the simplest form of apparatus for the induction and maintenance of artificial pneumothorax.

FROM L. S. T. BURRELL,

M.A., M.D. (CAMB.), F.R.C.P. (LOND.),

Physician to the Brompton Hospital for Diseases of the Chest; Consulting Physician, Cambridgeshire Tuberculosis Colony.

There is no one cure for pulmonary tuberculosis, and treatment which may be helpful at one stage of the disease may be actually harmful to the same patient at another. But one of the great principles in the treatment of tuberculosis is to procure rest for the diseased part, and artificial pneumothorax is the best method of resting a lung. If collapse therapy is regarded as a safe and simple means of applying this principle, one will not underrate or overrate its true value It is indicated whenever the diseased lung requires more rest than can be obtained by keeping the patient in bed. For example: (1) An active unilateral lesion which fails to subside in spite of a period of rest in bed. (2) A bilateral case, in order to check an active spread on one side. In such a case it is often desirable to keep up the pneumothorax for a short time only, and on stopping one frequently finds improvement on both sides. Artificial pneumothorax may also be induced for certain symptoms such as severe or repeated hæmoptysis, or to collapse a cavity when there is much sputum; or, again, in a case where in spite of active disease it is essential for a patient to return to work, for he may do so with much less risk if the bad lung is kept collapsed. It often happens that owing to adherent pleura the lung cannot be efficiently collapsed, but when a collapse is obtained the patient almost invariably improves. I know of no treatment which gives more striking immediate results: the later results and the ultimate success of the

treatment are largely dependent on correctly spacing the intervals between refills and giving the right quantity of gas, since the optimum degree of collapse varies considerably in individual patients.

From W. H. WYNN,

M.D., M.SC., F.R.C.P.,

Professor of Medicine in the University of Birmingham; Physician to the General Hospital, Birmingham; Consulting Physician to Birmingham Municipal Sanatorium.

Artificial pneumothorax has now a firmly established place in the treatment of pulmonary tuberculosis. The maintenance of a satisfactory collapse for a sufficient length of time undoubtedly gives brilliant results in suitable cases. But it must be recognized that suitable cases form a small minority, probably less than 5 per cent. of all cases. The cold light of statistics shows that good results are almost limited to those cases of progressive unilateral disease in which a complete or nearly complete collapse can be obtained. The tendency, so often seen with other successful but limited forms of treatment, to widen the basis of selection is to be deprecated. Nor is there justification for those enthusiasts who maintain that an artificial pneumothorax should be induced as soon as consumption has been discovered, however early, and that once the lung has been collapsed it should never be allowed to expand again. Artificial pneumothorax also appears to be too often used as a sole method of treatment. The rapid improvement brought about in a favourable case is apt to cause a false sense of security and lead to an undue relaxation or neglect of those other measures, general and specific, which are valuable aids in the production of immunity and which would have been carried out had the condition not been masked by the collapse.

From H. MORRISTON DAVIES,

M.A., M.D., M.CH., F.R.C.S.,

Medical Superintendent, Vale of Clwyd Sanatorium, Ruthin, North Wales.

Artificial pneumothorax achieves many great successes, but it gives rise to many great disappointments. An artificial pneumothorax, if it produces complete collapse of the affected lung and the case is rightly chosen on general as well as local grounds, is one of the most beneficial of modern methods in the treatment of pulmonary tuberculosis. The same may be said of it if the collapse, though incomplete, is sufficient to control the diseased area. A straightforward artificial pneumothorax is a simple affair. More often there are adhesions and effusions which

may be disturbing complications. Artificial pneumothorax should rightly be used as a method of treatment in (1) early unilateral cases (or mainly so), for patients who are not showing an adequate response to sanatorium treatment; (2) acute unilateral cases; (3) chronic and mainly unilateral cases in which mechanical changes are present; and (4) for the arrest of hæmorrhage. It should certainly not be reserved as a "last resort" method of treatment: only in exceptional cases will it be of value. Artificial pneumothorax should always be carried out with systematic X-ray control. If there are one or more defined adhesions interfering with collapse, they should be examined with a thoracoscope, and if their character permits of it, divided with the galvano-cautery. It should be noted that high pressures may rupture adhesions; they are more likely, however, to rupture the lung. Displacement of the mediastinum must also be avoided. Bilateral partial collapse, the pneumothorax of the second side being started after the establishment of the first, is an established procedure of great value in selected cases. Hemi-diaphragmatic paralysis is an asset to artificial pneumothorax. It tends to lengthen the interval between refills, to diminish the incidence of effusions; it is of great value when the lower lobe is adherent to the diaphragm or is not under control by the pneumothorax; it reduces the distortion and drag when a lung is re-expanding by design or as the result of progressive adherence of the pleural membranes. In cases in which the pneumothorax is inefficient or unsatisfactory, it is best, if the active disease is unilateral, to abandon pneumothorax and do a thoracoplasty. In certain unilateral cases in which the disease is very chronic and associated with extensive mechanical changes or a large thin-walled cavity, a thoracoplasty is preferable to artificial pneumothorax.

FROM HERBERT DE CARLE WOODCOCK,

M.D., M.R.C.S., F.R.C.P.E., D.P.H.,

Consulting Physician, Leeds Tuberculosis Department.

Artificial pneumothorax is the process by which the pleural cavity is blown up and the lung contracted. The compressing gases may be air, oxygen, nitrogen, or carbon dioxide; paraffin may also be used. (1) Air is easily available. (2) Oxygen is said to cause pleurisy more readily than the other gases, but gas embolism is less likely to result. (3) Nitrogen is less easily absorbed by the pleura and the blood. If nitrogen permeates the blood stream the probable result is gas embolism. (4) Carbon dioxide, like oxygen, is less likely to cause gas embolism. In addition to, and in consequence of, the inflation of the pleura, other parts, or other organs, are subject to pressure. Adhesions are stretched,

the heart may be displaced, or the diaphragm forced down and its movement limited. These results can cause acute pain and distress to the patient. Various nervous sequelæ may also follow distension of the pleura, such as intense pain, often referred to a distance, marked cardiac irregularity, temporary or continued dyspnœa, acute pulmonary œdema, slowing or quickening of the heart beat, mental unconsciousness, and slight, or severe, convulsive movements. Such painful and dangerous results of a simple procedure can be prevented by careful technique. Local anæsthesia should always be used: Novocaine 1½ per cent., with, in most cases, the addition of adrenalin or heroin $\frac{1}{1\frac{1}{2}}$ grain, should be given at every operation. The gas must be warmed and must never be forced into the pleura at an undue pressure, or too rapidly. The nerves of the pleura object to any interference, and the introduction of a very large amount of gas at a first operation is a physiological crime, except in cases of severe and uncontrollable hæmoptysis. Artificial pneumothorax is dramatically triumphant over hæmoptysis. Hæmoptysis can be stopped by applying gas pressure to the bleeding spot, but the wrong lung must not be compressed, and it is well to remember that, in dealing with a severe hæmoptysis, one has also to deal with a debilitated heart. It is because of the latter that the operation which immediately stops an hæmoptysis is not, in principle, the one which attempts to cure acute or chronic disease of the lung by the slow process of filling the pleura. One may be compelled to give a large dose of compressing gas, but, in a case of hæmoptysis, it must be given with great care and discretion. Gas to the amount of 1,000 c.c. may be sufficient to stop the bleeding. A dose of 2,000 c.c. might kill the patient by radically disturbing the heart in its function. One filling is given for hæmoptysis, and a refill usually follows two days after. Then the patient is left to recover his cardiac strength before the procedure is repeated. If the hæmoptysis has stopped it is advisable to allow a month to elapse, and then and only then is it safe to begin the routine treatment of the disease, and afterwards continue, week by week, inflating the pleura with small amounts of gas.

FROM BERNARD HUDSON,

M.A., M.D., M.R.C.P., M.R.C.S., L.R.C.P., SWISS FEDERAL DIPLOMA,

Medical Superintendent, Victoria Sanatorium, Davos; late Medical Superintendent, English Sanatorium, Montana.

During the last twenty-five years many alleged cures for pulmonary tuberculosis have made their appearance, one after the other, only to fade ultimately into oblivion; but in "collapse therapy," as exemplified by artificial pneumothorax, phrenecotomy, and thoracoplasty,

we have serviceable measures which have come to stay. In a unilateral case of pulmonary tuberculosis, or at any rate in a case where the better lung is only slightly affected, and where the patient does not show signs of responding to ordinary rest and general hygienic treatment after a certain time, say four months, then, in my opinion, an attempt should be made to collapse the lung, which is the seat of the active, progressive, tuberculous disease. The procedure may be adopted on either of the following grounds: (1) To cut short active tuberculous pulmonary disease when unilateral, even if only of slight extent and early stage; (2) to diminish wearing cough and excessive sputum; (3) to arrest severe pulmonary hæmorrhage, or to stop frequently occurring hæmoptyses. All doctors who have had experience in the production of artificial pneumothorax have had good results, fair results, and also bad results. Many medical advisers have had cases which have been arrested for very many years, but there is no doubt that the remote results are often not as satisfactory as are the immediate results; the latter are not infrequently most striking and dramatic. Still, when it is remembered that a great many of the cases which are submitted for the production of artificial pneumothorax are really bad cases—rapidly proceeding downhill towards death—it is certainly wonderful to think that there are means available which, if judiciously carried out, enable the active spread and rapid evolution of the disease to be arrested in a goodly number of subjects. There is still much to be learned concerning the details of a proper technique. For instance, we still desire further light on the indications and contraindications which should guide us in our decisions; and we need a more precise knowledge regarding the duration of the actual treatment. Still, judging by results, in my opinion, the production of an artificial pneumothorax is a most valuable means whereby the health of reasonably early cases may be restored; and certainly this procedure often alleviates the sufferings of advanced cases. I am convinced that with further improvements in our methods, greater knowledge in the selection of cases, and a more precise technique, still better results may be expected and should be obtained.

FROM FREDERICK R. G. HEAF,

B.A., M.D., M.R.C.S., L.R.C.P.,

Medical Superintendent, King Edward VII. Memorial Sanatorium, Hertford Hill, near Warwick.

A great deal of work has been done, and much has been written to prove the efficiency of the artificial pneumothorax treatment of pulmonary tuberculosis, but the surest proof that the treatment is

beneficial is that there are very few workers who do not continue to practise this mode of treatment once they have adopted it. It is not suitable for all cases, but as our experience grows so the range of cases to which the treatment may be applied is broadened, and both early cases and a good number of advanced bilateral cases may be included in the selection. In the former case there is great hope of producing definite prolonged arrest of the disease, and in the latter, one finds that the patient's life is appreciably prolonged in a high percentage of cases. Of course, there are a considerable number of patients in whom it is impossible to induce an artificial pneumothorax on account of pleural adhesions, while in others it may be undesirable on account of the type of lesion—*e.g.*, fibroid or bronchitic cases—but taking those cases in which it is suitable, I think it is becoming more and more acknowledged that the treatment is sound, extraordinarily beneficial, and most gratifying to both the physician and patient. Artificial pneumothorax treatment, however, is not simply putting a needle into the pleural cavity every now and again and letting in a little air. A host of questions arise. When to refill? How much air should be given? What to do with pleural effusions? How to act with adhesions? How to treat the case if it becomes bilateral during the period of refills? Finally, and this is probably the most difficult question to answer: When can we terminate the treatment? In a short space it would be folly to attempt to answer these very pertinent questions, but I should like to state my experience with reference to the question of fluid and to the occurrence of disease in the healthy lung. Pleural effusions occur to a slight extent in the majority of cases, but it is only in a comparatively small number that the fluid increases and persists. Up to the present many authorities recommend the removal of this fluid and regard it as an undesirable complication; but recently I have allowed the fluid to remain, unless it was rapidly increasing in quantity or causing some embarrassment. I have found that nearly all these cases did exceedingly well. The fluid acted as a good splint to the tuberculous lung, it eliminated the necessity of continually refilling with air, and it answered the question of how long to continue the refills. One now rather hopes that fluid will appear, and I often wish that a safe and easily controlled method of inducing an effusion were available. A good prognosis may be made in many cases in which the effusion becomes purulent; although a few end fatally, these I think are cases in which a spontaneous pneumothorax occurs in the collapsed lung and gives rise to a mixed infection by inspiration. When this occurs the prognosis is always hopeless. As regards the cases in which an active lesion occurs on the side opposite to the collapse, I have found Sanocrysin of great value in stopping the progress of the disease. I think that it is in these cases that one obtains the best results from the

use of the drug. From this experience we now administer when possible Sanocrysin treatment concurrent with collapse therapy in all bilateral cases where one side is extensively infiltrated and the other shows early infection. Although pneumothorax treatment has been practised for many years, I have no doubt that its use is not nearly exhausted, and the more it is used, the more it will be used.

FROM ANDREW MORLAND,

M.B., B.S., M.R.C.S., L.R.C.P.,

Medical Superintendent, Palace Hotel Sanatorium, Montana, Switzerland.

Probably no other treatment gives such rapid improvement as a successful artificial pneumothorax. The best results are obtained in unilateral cases with some fibrosis. The presence of a cavity is an additional indication, but the operation should not be performed if more than a quarter of the other lung is affected. In the broncho-pneumonic type of the disease the result is not so good, and when X-ray examination shows evidence of recent disease spreading from the hilum horizontally or in a fan-shaped manner there is little prospect of success, even though much less than a quarter of the better lung is affected. With regard to technique, the initial operation is carried out by means of Riviere's trocar and cannula needle, the introduction of which becomes more controlled if the skin is first incised with a fine lancet. Local anæsthesia and morphia are always used for the initial operation. During the following month strict rest should be insisted on. In subsequent treatment X-ray control before and after the refills is essential, as displacement of the mediastinum must be guarded against, on the one hand, and re-expansion of the lung between the refills on the other. A satisfactory collapse is usually obtained by means of atmospheric or slightly negative pressures. In some cases with unusually movable mediastinum, a pressure as low as -6 cm. water may give the best result. In others, in which adequate collapse is prevented by adhesions, pressures up to $+20$ or even $+30$ may be used, but this pressure is not justifiable in cases in which there is reason to suppose the lung to be diseased near the attachment of the adhesion, as rupture followed by all the dangers of spontaneous pneumothorax may follow. Sometimes temporary improvement is followed by a spreading of the disease in the other lung. In this condition Sanocrysin may be of great help. We have recently succeeded in aborting a tuberculous spread in the uncollapsed lung by this means while continuing the artificial pneumothorax on the more affected side.

the heart may be displaced, or the diaphragm forced down and its movement limited. These results can cause acute pain and distress to the patient. Various nervous sequelæ may also follow distension of the pleura, such as intense pain, often referred to a distance, marked cardiac irregularity, temporary or continued dyspnœa, acute pulmonary œdema, slowing or quickening of the heart beat, mental unconsciousness, and slight, or severe, convulsive movements. Such painful and dangerous results of a simple procedure can be prevented by careful technique. Local anæsthesia should always be used: Novocaine 1½ per cent., with, in most cases, the addition of adrenalin or heroin $\frac{1}{12}$ grain, should be given at every operation. The gas must be warmed and must never be forced into the pleura at an undue pressure, or too rapidly. The nerves of the pleura object to any interference, and the introduction of a very large amount of gas at a first operation is a physiological crime, except in cases of severe and uncontrollable hæmoptysis. Artificial pneumothorax is dramatically triumphant over hæmoptysis. Hæmoptysis can be stopped by applying gas pressure to the bleeding spot, but the wrong lung must not be compressed, and it is well to remember that, in dealing with a severe hæmoptysis, one has also to deal with a debilitated heart. It is because of the latter that the operation which immediately stops an hæmoptysis is not, in principle, the one which attempts to cure acute or chronic disease of the lung by the slow process of filling the pleura. One may be compelled to give a large dose of compressing gas, but, in a case of hæmoptysis, it must be given with great care and discretion. Gas to the amount of 1,000 c.c. may be sufficient to stop the bleeding. A dose of 2,000 c.c. might kill the patient by radically disturbing the heart in its function. One filling is given for hæmoptysis, and a refill usually follows two days after. Then the patient is left to recover his cardiac strength before the procedure is repeated. If the hæmoptysis has stopped it is advisable to allow a month to elapse, and then and only then is it safe to begin the routine treatment of the disease, and afterwards continue, week by week, inflating the pleura with small amounts of gas.

FROM BERNARD HUDSON,

M.A., M.D., M.R.C.P., M.R.C.S., L.R.C.P., SWISS FEDERAL DIPLOMA,

Medical Superintendent, Victoria Sanatorium, Davos; late Medical Superintendent, English Sanatorium, Montana.

During the last twenty-five years many alleged cures for pulmonary tuberculosis have made their appearance, one after the other, only to fade ultimately into oblivion; but in "collapse therapy," as exemplified by artificial pneumothorax, phrenecotomy, and thoracoplasty,

we have serviceable measures which have come to stay. In a unilateral case of pulmonary tuberculosis, or at any rate in a case where the better lung is only slightly affected, and where the patient does not show signs of responding to ordinary rest and general hygienic treatment after a certain time, say four months, then, in my opinion, an attempt should be made to collapse the lung, which is the seat of the active, progressive, tuberculous disease. The procedure may be adopted on either of the following grounds: (1) To cut short active tuberculous pulmonary disease when unilateral, even if only of slight extent and early stage; (2) to diminish wearing cough and excessive sputum; (3) to arrest severe pulmonary hæmorrhage, or to stop frequently occurring hæmoptyses. All doctors who have had experience in the production of artificial pneumothorax have had good results, fair results, and also bad results. Many medical advisers have had cases which have been arrested for very many years, but there is no doubt that the remote results are often not as satisfactory as are the immediate results; the latter are not infrequently most striking and dramatic. Still, when it is remembered that a great many of the cases which are submitted for the production of artificial pneumothorax are really bad cases—rapidly proceeding downhill towards death—it is certainly wonderful to think that there are means available which, if judiciously carried out, enable the active spread and rapid evolution of the disease to be arrested in a goodly number of subjects. There is still much to be learned concerning the details of a proper technique. For instance, we still desire further light on the indications and contraindications which should guide us in our decisions; and we need a more precise knowledge regarding the duration of the actual treatment. Still, judging by results, in my opinion, the production of an artificial pneumothorax is a most valuable means whereby the health of reasonably early cases may be restored; and certainly this procedure often alleviates the sufferings of advanced cases. I am convinced that with further improvements in our methods, greater knowledge in the selection of cases, and a more precise technique, still better results may be expected and should be obtained.

FROM FREDERICK R. G. HEAF,

B.A., M.D., M.R.C.S., L.R.C.P.,

Medical Superintendent, King Edward VII. Memorial Sanatorium, Hertford Hill, near Warwick.

A great deal of work has been done, and much has been written to prove the efficiency of the artificial pneumothorax treatment of pulmonary tuberculosis, but the surest proof that the treatment is

beneficial is that there are very few workers who do not continue to practise this mode of treatment once they have adopted it. It is not suitable for all cases, but as our experience grows so the range of cases to which the treatment may be applied is broadened, and both early cases and a good number of advanced bilateral cases may be included in the selection. In the former case there is great hope of producing definite prolonged arrest of the disease, and in the latter, one finds that the patient's life is appreciably prolonged in a high percentage of cases. Of course, there are a considerable number of patients in whom it is impossible to induce an artificial pneumothorax on account of pleural adhesions, while in others it may be undesirable on account of the type of lesion—*e.g.*, fibroid or bronchitic cases—but taking those cases in which it is suitable, I think it is becoming more and more acknowledged that the treatment is sound, extraordinarily beneficial, and most gratifying to both the physician and patient. Artificial pneumothorax treatment, however, is not simply putting a needle into the pleural cavity every now and again and letting in a little air. A host of questions arise. When to refill? How much air should be given? What to do with pleural effusions? How to act with adhesions? How to treat the case if it becomes bilateral during the period of refills? Finally, and this is probably the most difficult question to answer: When can we terminate the treatment? In a short space it would be folly to attempt to answer these very pertinent questions, but I should like to state my experience with reference to the question of fluid and to the occurrence of disease in the healthy lung. Pleural effusions occur to a slight extent in the majority of cases, but it is only in a comparatively small number that the fluid increases and persists. Up to the present many authorities recommend the removal of this fluid and regard it as an undesirable complication; but recently I have allowed the fluid to remain, unless it was rapidly increasing in quantity or causing some embarrassment. I have found that nearly all these cases did exceedingly well. The fluid acted as a good splint to the tuberculous lung, it eliminated the necessity of continually refilling with air, and it answered the question of how long to continue the refills. One now rather hopes that fluid will appear, and I often wish that a safe and easily controlled method of inducing an effusion were available. A good prognosis may be made in many cases in which the effusion becomes purulent; although a few end fatally, these I think are cases in which a spontaneous pneumothorax occurs in the collapsed lung and gives rise to a mixed infection by inspiration. When this occurs the prognosis is always hopeless. As regards the cases in which an active lesion occurs on the side opposite to the collapse, I have found Sanocrysin of great value in stopping the progress of the disease. I think that it is in these cases that one obtains the best results from the

use of the drug. From this experience we now administer when possible Sanocrysin treatment concurrent with collapse therapy in all bilateral cases where one side is extensively infiltrated and the other shows early infection. Although pneumothorax treatment has been practised for many years, I have no doubt that its use is not nearly exhausted, and the more it is used, the more it will be used.

FROM ANDREW MORLAND,

M.B., B.S., M.R.C.S., L.R.C.P.,

Medical Superintendent, Palace Hotel Sanatorium, Montana, Switzerland.

Probably no other treatment gives such rapid improvement as a successful artificial pneumothorax. The best results are obtained in unilateral cases with some fibrosis. The presence of a cavity is an additional indication, but the operation should not be performed if more than a quarter of the other lung is affected. In the broncho-pneumonic type of the disease the result is not so good, and when X-ray examination shows evidence of recent disease spreading from the hilum horizontally or in a fan-shaped manner there is little prospect of success, even though much less than a quarter of the better lung is affected. With regard to technique, the initial operation is carried out by means of Riviere's trocar and cannula needle, the introduction of which becomes more controlled if the skin is first incised with a fine lancet. Local anæsthesia and morphia are always used for the initial operation. During the following month strict rest should be insisted on. In subsequent treatment X-ray control before and after the refills is essential, as displacement of the mediastinum must be guarded against, on the one hand, and re-expansion of the lung between the refills on the other. A satisfactory collapse is usually obtained by means of atmospheric or slightly negative pressures. In some cases with unusually movable mediastinum, a pressure as low as -6 cm. water may give the best result. In others, in which adequate collapse is prevented by adhesions, pressures up to $+20$ or even $+30$ may be used, but this pressure is not justifiable in cases in which there is reason to suppose the lung to be diseased near the attachment of the adhesion, as rupture followed by all the dangers of spontaneous pneumothorax may follow. Sometimes temporary improvement is followed by a spreading of the disease in the other lung. In this condition Sanocrysin may be of great help. We have recently succeeded in aborting a tuberculous spread in the uncollapsed lung by this means while continuing the artificial pneumothorax on the more affected side.

FROM R. C. WINGFIELD,

B.A., M.B., B.CH., M.R.C.P.,

Medical Superintendent Brompton Hospital Sanatorium, Frimley, Surrey; Author of "Modern Methods in Diagnosis and Treatment of Pulmonary Tuberculosis."

Collapse therapy is a natural development of the rest treatment of pulmonary tuberculosis, and is without doubt the most important advance that has been made in the treatment of the disease in recent years. I feel that it will hold pride of place as our most efficient weapon until a specific cure or preventive of the disease is found. The cure of pulmonary tuberculosis is a task that has to be undertaken by the body's own natural resources, aided and guided by medical science. Unfortunately a large proportion of patients do not present themselves for treatment, or give their natural resources a chance until the disease has made great advances and their immunity is already staggering under the sledge-hammer blows of its attacks. It is in this crisis that the value of the artificial pneumothorax is so apparent. We all know that the treatment and education of the sanatorium will work wonders with the early non-febrile case, but is so useless in the obstinately pyrexial case with extensive lesions, that it is seldom worth while to put such a case in a valuable institutional bed. But the splinting of the offending lung will often so reduce the toxæmia that we are able now to send cases to sanatorium with a reasonably hopeful outlook that twenty years ago would have been allowed to die miserably at home.

The results of an artificial pneumothorax are often so dramatic in their success as to constitute a danger. Artificial pneumothorax is not a cure of pulmonary tuberculosis; it does not remove the disease, the tubercle bacillus is still there and ready to resume the attack at the first sign of negligence on the part of the patient. Remembering this, an artificial pneumothorax must not be used instead of, but only as an adjunct to, the general routine treatment. Nor should the apparent success of the treatment be allowed to form an excuse for careless after-care. One is apt to lose sight of one's artificial pneumothorax cases after a year or two of uninterrupted health; but if they are carefully followed up, a spread of the disease to the other lung will be found to be all too common among the foolish or the unlucky. Wherefore, to make full use of this most valuable treatment, we must realize its limitations and see it in its proper perspective.

FROM J. M. JOHNSTON,

M.B., CH.B., M.R.C.S., L.R.C.P., D.P.H.,

Physician-Superintendent of Tor-na-Dee Sanatorium, Murtle, Aberdeenshire, Scotland.

My personal experience of the treatment of pulmonary tuberculosis by artificial pneumothorax dates from January, 1920, and, up to the end of 1926, I have attempted to induce pneumothorax in 63 cases. In 23 of these I was either unable to find free pleura or found only small pockets; of these patients 2 are well, 9 are dead, 6 are ill, and 6 had thoracoplasty, all being alive and comparatively well except one, whose "good" lung became affected. In 21 cases a complete, or almost complete, pneumothorax was obtained, and of these 16 are well, the pneumothorax having been stopped in 8; 3 are dead, 1 is ill, and 1 had thoracoplasty but is now well. In 19 cases the pneumothorax was partial, but 12 are well (the pneumothorax having been stopped in 6), 5 are dead, and 2 are ill. Some of the patients who are either dead or ill were improved for a time but relapsed later or developed a serious complication; some of those now well may yet relapse. But since pneumothorax treatment was not undertaken until ordinary sanatorium treatment, with or without other special forms of treatment, had been given a reasonable trial and had failed, I think it may be claimed fairly that pneumothorax treatment definitely saved the lives of most of those who are now well, and enabled some of them to return to work sooner than would have been otherwise possible. There can be no doubt that artificial pneumothorax is a very valuable method of treatment for properly selected cases of pulmonary tuberculosis.

FROM N. TATTERSALL,

M.D., B.S.,

Chief Clinical Tuberculosis Officer, Leeds, and Assistant Medical Officer of Health for the City of Leeds.

In 1911 I assisted at the first induction of artificial pneumothorax ever done at the Brompton Hospital. Since that time I have never ceased to practise and preach the wisdom of a wide adoption of this form of treatment, nor have I regretted attempting it in any case. It must never be considered an alternative to the general routine of sanatorium treatment, but rather an additional and most potent weapon for the control of the disease in certain selected cases. In carrying out pneumothorax-therapy for the past sixteen years I have had more personal satisfaction, have received more gratitude, and have seen better results than from any other aid to treatment. While in actual practice the percentage of

cases found suitable for pneumothorax treatment is small, it is nevertheless true that a very large number of patients pass through a stage when it could be applied with immense and lasting benefit. I deprecate its use in very early cases as a routine, but feel strongly that the physician should frequently revisualize the prognosis in every case under his care and, instead of unduly prolonging the period of treatment by rest alone, induce a pneumothorax whenever possible, and before its period of usefulness has passed. The patient's point of view is also a factor of importance. He realizes the close individual attention to his case, and he usually responds by greater keenness in following out advice. There is less restraint and a quicker result. I can sum up my conclusions as follows: (1) The results of pneumothorax treatment are so good that its practice becomes an obligation; (2) use a simple apparatus, respect the manometer, and watch the mediastinum; (3) use plenty of local anæsthetic, frequent small refills, and the lowest pressure that will control symptoms; (4) each case presents an individual problem and cannot be treated by rule of thumb methods; (5) pleural effusions will occur, but often result in an obliterative pleuritis with pulmonary fibrosis and healing of the lesion.

From A. P. FORD,

M.R.C.S., L.R.C.P., D.P.H.,

Clinical Tuberculosis Officer and Deputy County Medical Officer of Health for the county of Hertfordshire.

The treatment of pulmonary tuberculosis by inducing an artificial pneumothorax is probably the greatest advance in the treatment of the disease of recent years. In order to obtain a definite cure it is probably essential that the case should be unilateral or, at most, have only a very limited amount of disease in the better lung. It is frequently quite possible, however, to arrest or considerably modify the symptoms of quite an advanced case by collapsing the worse lung. From the point of view of the Public Health Official, the chief advantage of this form of treatment lies in the fact that in a large percentage of cases (in our own cases in Hertfordshire over 80 per cent.) tubercle bacilli disappear from the sputum within about three months of the primary induction. It is at present too soon to come to any definite conclusion as to the permanency of a cure, but there is no doubt that the results are decidedly encouraging. In Hertfordshire, of those patients in whom a satisfactory, although not necessarily complete, amount of collapse has been obtained 77 per cent. have definitely improved, while 14 per cent. have died. These figures compare very favourably with those of patients who have refused this form of treatment; of these 5 per cent. have

improved and 65 per cent. are already dead. Until recently it has been the practice of most workers to confine A.P. treatment to those cases which have not responded to ordinary sanatorium treatment, but one is gradually coming to the conclusion that the treatment should be given to all unilateral cases whose sputum contains tubercle bacilli. It should be emphasized that A.P. treatment must be combined with the ordinary general treatment of tuberculous disease, and that with this form of treatment, as with all others, early diagnosis is essential.

FROM E. H. ALLON PASK,

M.D., B.S., M.R.C.S., L.R.C.P.,

Medical Superintendent of the High Carley Sanatorium, Ulverston, Lancashire, and Tuberculosis Officer to the Lancashire County Council.

I have practised artificial pneumothorax during the last five years. At first oxygen was given at the initial operation, and atmospheric air for subsequent refills, but now I have discontinued giving initial doses of oxygen. The cases receiving this form of treatment are those which are found not to be responding to ordinary sanatorium treatment. I do not confine this treatment to cases with unilateral disease. I have never found the treatment to light up any trouble on the opposite side. The average dose for the refills I employ is perhaps rather a large one (1,000–1,500 c.c.), as my experience is that the smaller doses do not give satisfactory collapse. Whilst in some cases the X-ray shows evidence of temporary displacement of the mediastinum, I have not found any unfavourable symptoms develop as the result of this. In one case after artificial pneumothorax the air tracked up into the neck behind the trachea, causing considerable swelling and respiratory embarrassment, the air eventually becoming absorbed in the course of six days. Evidently in this case there had been a communication between the pleural cavity and the posterior mediastinum. Some time ago, when I used to employ an initial dose of oxygen, I withdrew some of the gas from the pleural cavity on the second day after the injection, and Dr. Leonard Hill, who was conducting research work on metabolism at High Carley Sanatorium, kindly examined the composition of the gas, and it was found to be as follows: Nitrogen 79·76 per cent.; oxygen 15 34 per cent.; carbon dioxide 4·9 per cent., which is practically the composition of the alveolar air. During 1926 this treatment was employed in eight cases, and in one case only was it found to be impossible to carry out the treatment owing to adhesions. The remaining seven cases had numerous refills with beneficial results, and the treatment is still being continued either at the sanatorium or the dispensary. In all the cases the sputum was positive. Of these seven

cases the sputum has become negative in three cases, the percentage being 42·85, which compares very favourably with cases receiving ordinary treatment at the sanatorium during 1926, where the bacillary loss was 16·98 per cent.

FROM R. C. HUTCHINSON,

M.D., D.P.H.,

Resident Physician, Nordrach-on-Dee Sanatorium, Banchory, Scotland; late Medical Superintendent, the Royal National Hospital for Consumption and Diseases of the Chest, Ventnor, Isle of Wight.

During the last three decades there have been numerous remedies introduced for the cure or alleviation of pulmonary tuberculosis. The factors common to most of them have been their application to the treatment of early cases, and the fact that their mode of action has been but partly understood by the practising physician. The advance which has resulted in the adoption of artificial pneumothorax is largely due to the fact that it is applicable even to advanced lesions, and any good results obtained are speedily appreciated by both the patient and his doctor. Failures and catastrophes in the use of medicaments, of which tuberculin and the heavy metal salts may be regarded as examples, have usually been set down to the use of wrong doses or their incorrect spacing. Although pneumothorax treatment is comparatively simple in its action and its control can be effected by our major senses (hearing, sight, and touch), there is still the risk that haphazard choice of patients and lack of individual attention may bring it into the disrepute which followed the peak of apparent success in the remedies which preceded it. If pneumothorax treatment is to maintain its position there are certain essentials which should be strictly followed: (1) Initiation and early treatment in a residential institution (except in cases of urgency—*e.g.*, profuse hæmoptysis); (2) close X-ray control—that is, screening before and after every refill. Treatment in an institution averages from four to six months. At the end of that time it is usually possible to estimate with some accuracy the optimum intervals between refills, the amount of air to be given, and the pressures most suitable for each individual—three points of the utmost value to the physician taking future charge of the case who may not have equal facilities for X-ray control. The discriminating use of phrenic evulsion may turn a case of poor outlook into one of hope. When numerous broad adhesions are present and recurrent effusions a feature, the question of more extensive surgical interference should be considered at a sufficiently early date to allow the surgeon a reasonable prospect of success.

FROM G. ELEANOR SOLTAU,

L.R.C.P.E., L.R.C.S.E., L.R.S.P.S.G.,

Assistant Medical Superintendent of the East Anglian Sanatorium, Nayland, near Colchester.

As medical officer in charge of young tuberculous cases in the East Anglian Children's Sanatorium, Nayland, Colchester, I propose to restrict my comments to treatment by artificial pneumothorax in children who have been under my care. Collapse-therapy is very much the same in children as in adults, and the same complications arise as in adult patients. The type of case in which this treatment has been used has been almost entirely that which we call the "adult type"—*i.e.*, patients suffering with cough, positive sputum, and some degree of fever. The younger children give the best results. Girls at the age of puberty, thirteen to seventeen years, do very badly when suffering from febrile tuberculosis. There have been some good results in girls of this age when the disease has been definitely limited to one or two lobes, and when there has not been a great amount of general disturbance and toxæmia. Of the nine boys in whom artificial pneumothorax has been induced eight were right-sided ones, and the boy who had left-sided trouble was a doubtful case. Tubercle bacilli were never found, and the lesion was not at all typical. Of the girls, sixteen were left-sided and eight right-sided. Children make very good patients for this form of collapse-therapy, and once having got over their fear of the "pricks," take a great interest in the proceedings. As with adults, so with children, the production of artificial pneumothorax is a most useful adjunct to treatment. The children, if residing in an open-air school, can continue their education and, in consequence, enjoy much better health and maintain good spirits. The treatment in most cases does not have to be continued for such long periods; in fact, the pneumothorax is more likely to come to an end spontaneously through collapse of the chest wall, and the lung gradually becoming adherent. Adhesions are encountered just as frequently as in adults, and often only a partial collapse is obtained, but even this seems highly beneficial in promoting the arrest of the disease, and partial collapse of the lung for a few months is not to be despised.

ORIGINAL ARTICLES.

THE TUBERCULOSIS PROBLEM IN THE UNITED STATES: IMPRESSIONS OF A VISIT TO AMERICA.

By COLONEL S. LYLE CUMMINS,

C.B., C.M.G., M.D.,

David Davies Professor of Tuberculosis, Welsh National School of Medicine, Cardiff.

Although I had passed hurriedly through New York on my way to the great International Tuberculosis Conference, my first real impression of America was gained on arrival at Washington, where, on entering the Mayflower Hotel, I found myself among a host of old war-time friends, including Dr. Welch and Dr. Thayer of Baltimore; Dr. Linsly R. Williams of the American National Tuberculosis Association, who was really the Managing Director of the Conference; Dr. Charles White and others. A tour through the wide corridors of the Mayflower Hotel sufficed to show the international character of the gathering: Dr. Rist and Dr. Leon Bernard from Paris; Dr. Harbitz and Dr. Jacobæus of Norway and Sweden; Dr. Loewenstein from Vienna, and a host of others; while the English contingent included Sir Henry Gauvain, Dr. F. J. H. Coutts of the Ministry of Health, Dr. Varrier-Jones, Dr. Fergus Hewat, Dr. Nathan Raw, and other well-known British students of tuberculosis. A visit to the bureau, where delegates were given details regarding the Conference, gave a hint of the highly organized business efficiency so characteristic of America. Here each arrival was taken kindly in hand by expert advisers, who seemed to know all about him, and arranged that invitations should be handed to him, programmes of the various sections and entertainments placed at his disposal, and even his photograph taken if need be. It seemed to be the one aim and object of the charming ladies who were charged with this duty of direction and advice to prove to every visitor that he was the one and only person who mattered, and that America had been waiting spell-bound for his arrival.

Our first afternoon was spent in a round of visits to friends who had kindly left messages for the delegates; and I was able to renew my acquaintance with General Ireland, the Surgeon-General of the United States Army; Surgeon-General Hugh S. Cumming, the head of the

Public Health Services; Colonel Silar, of the United States Medical Service, and many others.

The first three days of the meeting were occupied with the work of the International Congress on Tuberculosis, where the excellent system was in force of devoting the whole of each session to one important subject. Amongst the principal papers were "The Communicability of Tuberculosis in Adults," by Professor G. Ronzoni of Milan; "The Anatomical Structure of Tubercle from Histogenesis to Cavity," by Dr. Allen K. Krause of Baltimore; "Tuberculosis and Milk," by Dr. William H. Park; "The Progress and Organization of Anti-Tuberculosis Work in the United States," by Dr. Linsly R. Williams; and "Varying Trends in Tuberculosis Work," by Dr. Gerald Webb. All the papers were excellent, and the contributors to the discussions had sufficient time to give full weight to their remarks.

The communication which remains in my mind as perhaps the most important of all was that of Dr. Allen K. Krause, who for two hours, without pause or hesitation, spoke on the anatomy of the tubercle and its significance in relation to the pathogenesis of the disease. It has seldom been my lot to hear a more lucid or comprehensive exposition of an intricate subject. Never once did the lecturer flag or lose continuity; never once did the attention of the audience wander. There must be very few who can speak for two consecutive hours with such sustained interest and enthusiasm. The lecture was a *tour de force*.

On the termination of the International Conference, the Conference of the National Tuberculosis Association followed, and under the direction of Dr. Linsly R. Williams, was organized in sections for the convenience of those whose interests lay in special sub-divisions of tuberculosis work. So interesting were the discussions in the pathological and immunological sections that I had no time to spare to visit the others, but I heard on all sides of the wonderfully interesting papers which I was missing by sticking to the subjects which I had most at heart. This loss was made good, however, by the distribution of "Abstracts of Papers" got together in advance by the staff of the National Tuberculosis Association, in which one could read for oneself all the principal communications made to the Conference. Some overlapping of sections is inevitable in every Congress, and one could only praise the splendid organization which had brought together such a number of interesting communications from all parts of the world. To walk through the room of any given section was like running one's eye down the bibliography in a modern text-book on tuberculosis, so numerous and representative were the visitors to the Congress.

Dr. Lydia Rabinowitsch-Kempner was present, and her communication on the subject of the various types of tubercle bacilli was such as might be expected from a scientist of world-wide fame. The

paper by Florence R. Sabin and Charles A. Doan on "The Rôle of the Monocyte in Tuberculosis" was a memorable addition to a difficult and important subject.

It was a wonderful experience to meet at first-hand so many people whose works one had read and whose names had been household words for years: Theobald Smith, Baldwin, Krause, Lawrason Brown, Petroff, William Snow Miller, Archibald from Montreal, and Caulfeild from Toronto. It seemed as if the *American Review of Tuberculosis* had incarnated itself in the persons of its editor and contributors. Dr. William Snow Miller had brought with him some of his beautiful reconstructions of tubercles and preparations illustrative of his work on the lymphatic drainage of the lungs. It will be long before I lose the impression of pleasure at meeting this great anatomist and seeing at first-hand specimens of his wonderful work on the anatomy and histology of the human lung—work which is of fundamental importance to every student of pulmonary tuberculosis. It would be impossible in a short article to attempt to summarize or even mention the various papers communicated at this great meeting.

During my visit to Washington I had the privilege, through the kindness of Dr. Welch and Dr. Thayer, of visiting the Johns Hopkins School of Medicine and the new Institute of Preventive Medicine at Baltimore, where I spent a memorable day in Dr. Welch's new building and in the wonderful pathological department directed by Professor MacCallum.

Through the kindness of the Surgeon-General and of Colonel Silar I was able to meet Major Callender, and to visit with him the great Army Medical Museum at Washington, surely one of the finest pathological museums in the world; and I entertain the most delightful recollections of a long day spent with Surgeon-General and Mrs. Cumming when they showed to Dr. Leon Bernard and myself the beauties of their native Virginia, visiting the battlefields sacred to the memory of Stonewall Jackson and General Lee. Through the kindness of Dr. White I had been made a temporary member of the Cosmos Club, a convenience which not only provided me with an excellent place for lunching and dining, but also a library where one might read and a quiet room to write in after the strain of the long meetings at the Mayflower Hotel.

On leaving Washington I made my way, at the kind invitation of Dr. Baldwin, to Saranac, spending a day in New York *en route*, where I had the honour of being the guest of the officers of the Rockefeller Institute at a delightful luncheon. At Saranac Dr. Baldwin laid himself out with his characteristic kindness and hospitality to show me as much as one could possibly see in the time of the splendid Trudeau Sanatorium and the various annexes and

nursing hospitals connected therewith. Here I had the pleasure of spending interesting hours with Dr. Lawrason Brown, who showed me his latest work on the diagnosis and treatment of abdominal tuberculosis; with Dr. Petroff, whose laboratory work is lending such distinction to the Trudeau Institute; and with Dr. Trudeau himself—the son of the great Trudeau of Saranac—who, following in his father's footsteps, is devoting his life to the treatment of tuberculosis. Here, too, escorted by Dr. Baldwin, I was enabled to visit the Raebrook Sanatorium and to meet its director, Dr. Bray, and several of his colleagues.

Of especial interest to me was the work of Dr. Smith, a research student at the Raebrook Sanatorium, who is devoting much of his time to the study of bronchiectasis and pulmonary abscess, in the etiology of which he gives great prominence to a spirochæte, probably similar to that described by Castellani in Ceylon and in this country. One could not be at Saranac without being struck by the splendid team work in progress there, and the loyal co-operation of a great band of workers devoted to the same end. Just as one cannot visit the Pasteur Institute in Paris without the feeling that the spirit of Pasteur is imminent in its workers, so at Saranac the spirit of Trudeau seems still to inspire and direct almost as if he himself were present to-day.

As for Saranac itself, it was my good fortune to be there at the most beautiful time of the year. The hills around the lakes were resplendent with the gold and crimson of the maple-trees in their autumn colours, and the reflection of the hills and forests in the untroubled waters of lake after lake amongst the mountains left an impression not easily to be forgotten. Doubtless the climate is very cold in the winter, and, indeed, we can read in Trudeau's autobiography of an occasion when he and his family came near to perishing in the snow during a journey in winter; but at the time of my visit the climate was bracing and warm under the midday sun and cool and fresh in the evening. Sharp frosts had already started at night, and the contrast to the summer-like conditions of Washington was marked. At Saranac I fell in again with Sir Henry Gauvain, and together we made the journey on to Montreal. At the end of this trip we parted for the time being as he had engagements in the direction of Detroit, while my programme included a couple of days at Montreal itself and a trip through the University centres of Canada.

At Montreal I was met by Dr. Wodehouse, the secretary of the Canadian National Association for the Prevention of Tuberculosis, who became my guide, comforter, and friend during the following eight days. My time at Montreal was all too short, but I spent a delightful morning with Professor Meakins, the head of the medical unit, and

afterwards visited Dr. Rabinowitsch in Montreal General Hospital, whose biochemical work on the blood is so well known. My brief visit to the Magill University filled me with admiration for a great educational institution working on the most progressive lines. Here I had the pleasure of again meeting Dr. Archibald, who has added so much to modern knowledge of chest surgery in tuberculosis, and Dr. Frazer, the Dean of the Medical Faculty, by whose kindness I was given every facility for visiting the school.

The succeeding week was a round of visits to various parts of Canada accompanied by Dr. Wodehouse, whose never-failing high spirits and wonderful powers of organization did so much to make my programme easy and enjoyable. We visited London, Ontario, with its charming medical school, and spent a couple of very interesting days at Toronto, where Professor Fitzgerald, an old friend and colleague since the days of the Great War, when he came to France in charge of a mobile laboratory, devoted a whole morning to showing me over the Connaught laboratories and the new buildings now in course of erection. Here, too, I spent a delightful afternoon with Dr. Caulfield, and had an opportunity of seeing at first-hand his technique for the inhibition test in complement deviation with tuberculous serum. In the evening I was entertained to dinner at a club filled with records and exhibits illustrating many years of history in connection with famous British and Canadian regiments. It was a delightful experience to find the military traditions of the Empire so faithfully preserved and so deeply honoured. From Toronto I went to Hamilton, Ontario, where I had the pleasure of visiting a very fine sanatorium and meeting many old friends; and then I travelled on to Kingston to see the Queen's University—a delightful institution, recalling one of the Scottish Universities, and, indeed, staffed almost exclusively by Canadians of Scottish origin or by professors imported directly from north of the Tweed.

Leaving Kingston late at night, after a most delightful day, I journeyed back to Niagara, where, through the kindness and hospitality of Dr. Colbeck, I was enabled to see the beauties of the district under the most agreeable conditions. I had always been given to understand that the falls were best in photographs and that visitors tended to experience a sense of disappointment when they met the actuality. This was not my experience—the splendour of Niagara Falls baffles all description, and photographs give but the mildest impression of the terrific force and the inexpressible grandeur of one of Nature's greatest wonders. Unhappily, some ingenious electrician has had the idea of applying modern science to, as it were, "paint the lily," and at night the falls were illuminated with alternating colours from wonderful projectors situated on the Canadian side. To me this attempt to bring the

Niagara Falls up-to-date was unspeakably disagreeable. It was really astonishing to see how completely the beauty of Nature could be destroyed and how successful was the effort to give the impression of a coloured photograph instead of a stupendous reality. All that can be said in its favour is that the tourists seem to like it; for there were crowds to see the colour display, and one heard exclamations of delight on all sides. My companion and I decided that we must be either too high-brow or too low-brow for the scene! We did not know exactly which! Here, too, I was taken to see the Brock monument, an inspiring reminder of glorious days, and I had the great pleasure of being introduced to Dr. MacDonald, whose experiments in connection with the treatment of "high blood pressure" by means of liver extract are exciting so much interest at the present time. Here, as the guest of Dr. Colbeck, I enjoyed a delightful farewell dinner before leaving Canada, and was invited to give an address, not on tuberculosis, as they realized that I had been talking on the latter subject for a week, but on the "present position of British political parties," a subject on which my information was so meagre that I could safely give free play to my imagination; but my auditors were kind enough to relieve me of any responsibility for accuracy and to receive my impressions and recollections of British newspapers as if they were words of wisdom.

It was with many regrets, and with a deep sense of gratitude for the kind hospitality that had been shown to me throughout my visit, that I said good-bye to Dr. Wodehouse and Canada. Everywhere I had been received with most real and genuine hospitality, and men whom I knew to be extremely busy had gone out of their way to show me attention and kindness. It was inspiring to encounter the representatives of the medical profession in a colony so loyal and so devoted to England as Canada, and one felt that the flattering reception which was always given to one's poor efforts in the way of lectures and demonstrations was intended as a tribute to the Old Country.

From Niagara I travelled on through the night to Cleveland, Ohio, where I was met next day by Dr. Placak, the Chief Tuberculosis Officer, and where I had been invited to give an address to the Cleveland Branch of the National Tuberculosis Association. Here the evening papers of the day before appeared to have been interesting themselves in tuberculosis, and it seemed that a report had been circulated that Robert Koch, the discoverer of the tubercle bacillus, was due to address a meeting at the hospital where I was to speak! Another illusion which I had to dispel was that I was not merely a Professor in the Welsh University, but also a distinguished Welshman and a great authority on the language and poetry of the Principality. It appeared that there was a large Welsh section in Cleveland, and I was welcomed by a delightful Chairman, Mr. Hopkins, whose ancestors hailed from

South-West Wales, while the intervals of lunch were enlivened by the singing of a Welsh choir. I feel sure that my hosts must have been deeply disappointed to learn that I was merely an Irishman after all; but such was their politeness that they did not allow this discovery to make any difference in their cordiality or in the favourable reception which they gave to my lecture. After the luncheon and address, I was enabled to visit the General Hospital, where a section is set aside for the treatment of tuberculous cases; and I ended my day in Cleveland by an unforgettable dinner and visit to the theatre, organized by Dr. Placak and some of his kind friends, who saw me off by the midnight train which was to take me to New York.

My time in America was now drawing to a close, but there still remained a few delightful days to enjoy. In New York I had the honour of delivering the Hermann Biggs Memorial Lecture, and also of addressing the Brooklyn Medical Society; while, through the kindness of Dr. Simon Flexner, I was given the opportunity of visiting the wonderful Rockefeller Institution, and meeting Dr. Nogouchi, Dr. Cowdry, and many others. Here, too, I visited the offices of the National Tuberculosis Association, and also of the New York Tuberculosis Association, and saw the excellent lines on which these great organizations are worked. Mr. Godias J. Drolet was untiring in placing at my disposal information relating to tuberculosis and other illnesses in New York City, and in giving me reprints describing the valuable work which he is himself carrying out.

As I looked back at the wonderful outlines of New York and its sky-scrapers from the deck of the departing steamer, my most poignant feeling was one of regret that I was obliged to leave America having seen so little. There were so many places that I had always longed to visit, so many people whom I had always longed to see, and yet the time at my disposal had made it impossible to realize all these ambitions; but, as the voyage proceeded, I came to realize that I had seen much of what is most interesting and best in America, and that even such a brief visit had left impressions which were becoming more and more definite as I stood away a little further from the picture.

My clearest impression is one of the extreme vigour and enthusiasm which our American colleagues are bringing to the study of tuberculosis; not only have they a wonderful power of organization, but they have the "sinews of war." Not only have they what appears to British eyes boundless wealth, but they know how to use it, and are applying their knowledge with conspicuous success.

It is rash for a visitor to draw definite conclusions or to pass definite opinions after such very brief and partial opportunities for observation, but the National Tuberculosis Association seemed to me to be filled with a spirit of mutual help and friendly co-operation

combined with a freedom from petty or personal jealousy which could not be too much admired. And the same spirit seemed to draw together the efforts of the various research centres. The work at Saranac seemed to be linked up with the work at Baltimore; the work at Baltimore to be closely associated with the work at New York; the workers in America to be in close touch with the workers in Canada; and each group only anxious to help and to receive help from the others.

This may be merely the optimistic recollection of a delightful conference, and the reality may appear different to those on the spot; but such was the impression which I took away with me of tuberculosis work in the United States. It seems to me that the efforts of men like Dr. Allen K. Krause, Dr. Baldwin, Dr. Petroff, Dr. William Snow Miller, Dr. Willis, and many others, backed as they are by financial advantages which we do not enjoy in this country, and co-ordinated in the pages of the *American Review of Tuberculosis* and similar publications, must ultimately succeed in throwing a flood of light on the problems which still puzzle us in relation to the pathology, the treatment, and the prevention of tuberculosis.

THE PRESENT POSITION OF SURGERY IN THE TREATMENT OF PULMONARY TUBERCULOSIS.

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The treatment of pulmonary tuberculosis is a comparatively recent development of surgery, but enough experience has been acquired to estimate its value and its future possibilities. In this country its advance has been slow and has been undertaken against a considerable amount of prejudice. The latter is undoubtedly due to a lack of appreciation of its value and an exaggerated idea of the operative risks involved. Methods of direct attack on the lesion have proved unsatisfactory in the past, except in the rarest instances, as would be expected in such a disease, and hence have been abandoned.

Artificial Pneumothorax.

The whole aim of modern surgery in the treatment of pulmonary tuberculosis is the production of collapse. It cannot but be agreed that artificial pneumothorax is the method of choice in the production of pulmonary collapse, and in all cases where this type of therapy is advisable no operative treatment should be considered until this has failed.

In a certain proportion of cases artificial pneumothorax is quite impossible owing to generalized adhesions, in others only partial. Again, a certain proportion of cases in which complete collapse has been induced primarily and the treatment carried out over a period, maybe of months, fluid, later becoming purulent, appears in the pleura or the pneumothorax cavity commences to contract, requiring higher and higher pressures to maintain the collapse. In these types, and especially the latter, evidence of reactivation of the disease, as shown by signs and symptoms, will necessitate serious consideration of the possibilities of surgical intervention.

Pathological Considerations.

It will be unnecessary here to discuss the pathology of pulmonary tuberculosis except in so far as it is affected by surgical collapse. The general tendency of the tuberculous lung is to undergo healing by the formation of fibrous tissue. The latter forms around the infected foci and extends into the surrounding lung.

Cavities in the lung become surrounded by a layer of fibrous tissue in a similar manner to those occurring around abscesses elsewhere in the body. The natural tendency of this fibrous tissue is to retract and thereby complete the cure, but owing to the anatomical peculiarities of the thorax this is only possible to a limited extent where the lung is the site of the lesion.

These attempts at contraction of the healing tissue are shown in many cases by the diminution in capacity of the thorax or hemithorax. The ribs are found closer together, and the intercostal spaces are diminished, the diaphragm is higher than normal, the apex of the chest is depressed, and the structures of the mediastinum are drawn to the affected side, as shown by the position of the heart and trachea in skiagrams. Occasionally this may result in enough diminution of the chest capacity to bring about healing, but should this not be so, the pull of the contracting fibrous tissue begins to affect the bronchi, leading to dilatation of their lumina and the gradual establishment of a secondary bronchiectasis.

The Rôle of Rest.

It is a well-recognized principle in therapy that rest is an important factor in the promotion of healing in all types of inflammation. In

tuberculosis of the lungs every form of treatment adopted has had this principle for its basis. It is as a result of the recognition of these two main factors that the modern surgical treatment of pulmonary tuberculosis has been evolved.

When the accepted method of general rest, and thereby diminution in pulmonary activity, is not followed after some time by abatement of signs and symptoms and by improvement in the general condition, it is advisable to consider, especially in chiefly unilateral disease, the question of some form of collapse therapy. As stated above, artificial pneumothorax is the first step to be attempted, and only where this fails, or is partially successful, is surgical intervention indicated. Surgical treatment to supplement incomplete pneumothorax or to replace pneumothorax, where the latter is impossible, consists of four procedures: (1) Thoracoscopy and division of adhesions. (2) Extra-pleural pneumolysis. (3) Phrenic evulsion. (4) Thoracoplasty.

1. Thoracoscopy and Cauterization of Adhesions.

This method was introduced by Jacobæus of Stockholm several years ago, and was devised to deal with certain cases in which incomplete artificial pneumothorax resulted from the presence of band-like adhesions between lung and chest-wall. Many statistical tables have been published to show that there is a considerable difference in the end results of patients in whom collapse has been complete compared with those having adhesions; the prognosis in the former class is much better. I have previously described the method of operation, and shall not go into detail here.

The operation in the author's opinion has a very limited field of usefulness, and should be practised within these strict limitations. No attempt should ever be made to divide surface adhesions, nor should bands of greater thickness than 1 centimetre be attempted unless they are flat and long. Care will be required in the shorter bands not to cauterize the lung as well as the adhesions, and too many adhesions should not be divided at one sitting. Pleurisy contra-indicates the operation.

If the operation is kept within these limits it should be without complications such as pyopneumothorax, tuberculous or secondarily infected, which have been described and given rise to a definite mortality. A moderate degree of surgical emphysema is common on the ensuing days, but is never serious.

Two other observations may be made with regard to this method of treatment: firstly, that adhesions are generally more numerous than the X-ray photographs would suggest, and secondly, successful cauterization of adhesions is not invariably followed by a successful end result. In an experience of twenty thoracoscopies with a view to

cauterization, in only seven has the operation been successfully completed, and in three of these has the end result justified the procedure. No complications due to the operation have been encountered.

2. Extrapleural Pneumolysis.

In this procedure, advantage is taken of the fact that the parietal pleura can be separated from the inner surface of the thoracic wall through the subserous plane deep to the endothoracic fascia. As a result, collapse of a wider area can be brought about than by the former method, and it can be used in those cases where surface adhesions are present, especially overlying cavities.

The operation may be performed anteriorly, in the axilla, or posteriorly, and does not offer any considerable technical difficulty. The areas of firmest adhesion are at the apex of the pleura and on the upper mediastinal surface. The resulting space has been filled with various substances, fat from the abdominal wall, lipomata and portions of pectoral muscle, in addition to foreign substances, such as paraffin wax. Obviously the homogeneous graft is the best and is less likely to be extruded later or to cause the formation of fluid around. On rare occasions the fat liquefies and is largely absorbed.

This operation suffers from many disadvantages, most being dependent upon the fact that the collapse produced is very localized, whereas tuberculous disease is almost invariably more wide-spread in the lung than either the physical signs or the X-ray appearances would suggest. It is of little or no value except at the apex, and only in this position as a supplementary operation to artificial pneumothorax or thoracoplasty where an apical cavity is incompletely collapsed. In these only has it been used by the author, and the results would hardly suggest an extension of its use beyond these limits.

3. Phrenic Evulsion.

The division of the phrenic nerve in the neck and withdrawal of the distal or thoracic portion produces definite and complete paralysis of the diaphragm. Evulsion has taken the place of simple division owing to the fact that the latter was not always followed by paralysis as a result of the entrance of other branches from the cervical plexus below the point of division. Complete paralysis of the diaphragm is stated to reduce the pulmonary area by 400 to 800 c.c., and therefore gives quite a considerable amount of collapse.

The operation is performed under local anæsthesia, and apart from variations in position and size should not offer difficulty. Over fifty cases have been operated upon by the author for tuberculosis and bronchiectasis, without complication of any kind.

The indications for the operation in tuberculosis are numerous and

the results within these limits are very good. Evulsion of the phrenic can be performed on patients beyond the recognized age-limit for thoracoplasty with considerable benefit. As a test of the condition of the better lung preliminary to thoracoplasty it is of value, and in addition, in the author's opinion, it considerably diminishes the late toxic shock of the first stage thoracoplasty. Owing to the latter it is now used as a routine method preliminary to thoracoplasty. Patients obviously too ill for the major operation and in whom the disease is chiefly unilateral will often improve enough, in the course of some weeks after phrenic evulsion, to undergo thoracoplasty.

The benefit attained by this operation is not always maintained owing to the fact that the collapse is not enough, and this point should be borne in mind in order not to defer the major operation, where indicated, until too late. As a supplementary operation to artificial pneumothorax, the operation is useful—(1) in cases where diaphragmatic adhesions prevent collapse; (2) where refills are followed by persistent cough due to the adhesions; (3) where cavities higher in the lung remain uncollapsed, the relaxation of the diaphragm will often result in their obliteration. (4) It has been suggested that it should be used as a routine measure with artificial pneumothorax in order to prevent the reopening of cavities, which may occur when the refills are abandoned and the lung re-expands.

It is an interesting clinical observation that dyspnœa and cough are generally much diminished by the operation. This is due to relaxation of the tonicity of the diaphragm, which causes the dyspnœa, and to the unimpeded action of the strong abdominal muscles on the lower pulmonary lobe resulting in easy evacuation of the contents.

4. Thoracoplasty.

This operation, associated at its inception with a high operative mortality, has now become much more standardized as a result of the work of Sauerbruch, and the mortality much diminished. The paravertebral resection of portions of ribs from, and including, the first downwards as near as possible to the transverse processes of the vertebræ produces a considerable collapse of the hemithoracic capacity. The external deformity is slight. The amount of ribs removed should vary according to the general condition of the individual and according to the type and position of the more obvious lesions. The total length of ribs removed varies between 105 cms. and 125 cms.

Since performing phrenic evulsion as a preliminary the author has not found it necessary to remove any portion of the eleventh or twelfth ribs, but unless the upper ten are divided, the downward displacement of the chest-wall is prevented, and the amount of the collapse diminished thereby.

It is not intended here to discuss operative details, but there are two points which merit some remarks. The first concerns the question of the operation being performed in one or two stages. Each has advantages, but in the author's experience the advantage of the two-stage operation far outweighs the disadvantages. The operative shock is definitely diminished, but in addition to this the delayed or toxic shock, occurring about two or three days after operation and due to absorption of toxins from the compressed lung, cannot be estimated at the time of operation and hence may prove excessive.

Another point put forward against operation in two stages is that the strain is increased and the patient is not in such a fit state to undergo the second stage as the first. This is against the weight of evidence, as in almost every case it has been found that the blood-pressure is higher previous to the second stage than it was previous to the first stage. The only definite disadvantage is the necessity to undergo two operations rather than one, which in nervous patients has some slight influence—unless the facts are fully explained to them; by modern surgical technique the risk of gross sepsis should be negligible.

The second factor is the choice of anæsthetic. Abroad there is a great tendency to perform the operation under local anæsthesia, but even if painless this imposes a considerable strain on the nervous system of the patient. In the earlier cases of the present series, local anæsthesia, with preliminary hypodermic injection of morphia, hyoscine, and atropin, was used. Owing to the psychic factor, this has been replaced by the administration of gas and oxygen, with local anæsthesia superadded. Gas and oxygen anæsthesia is very difficult to administer satisfactorily without the addition of ether, which diminishes its value. When properly administered the patient should wake up while the dressings are being applied. There is only one apparent objection to this form of anæsthesia—namely, the increased vascular dilatation, and hence the increased bleeding in the operation area, which objection is easily overcome.

In a total of forty-one cases—thoracoplasties for pulmonary tuberculosis and bronchiectasis—the operative mortality has been 7·3 per cent., a state of affairs which, although offering room for improvement, compares very satisfactorily with the mortality in other major surgical procedures, and should not be prohibitive in such a serious disease. The percentage of cases cured or much improved is 52·4.

Indications for Surgical Interference in Pulmonary Tuberculosis.

It may be stated roughly that cases suitable for artificial pneumothorax, but in whom the latter cannot be induced, are suitable for

thoracoplasty. The condition of the better lung should, however, be more stringently reviewed. It is rare to meet with a case in which thoracoplasty is suggested and in which there has been no clinical nor X-ray evidence of the previous existence of disease in the better lung. It is advisable to wait until active signs, which at no time must have been widespread, have been absent from the better lung for at least three months, unless from a review of the case they are considered to be the result of the lesion in the badly affected lung.

If phrenic evulsion is done as a routine it will generally give a good indication of the result of strain imposed upon the better lung, and should definite increased lighting-up of lesions, hitherto quiescent, occur, the major operation should be either temporarily or permanently abandoned. The operation is considered inadvisable in children where the chest-wall tends to fall in, especially in cases of the fibrolic contracting type.

In adults over forty-five the value of the operation will be impaired by the rigidity of the ribs and ossification in the costal cartilages preventing subsequent collapse. The general condition of the patient is of considerable importance, but it is very remarkable how patients with low blood-pressure, even as low as 95 mms. Hg. systolic, will tolerate the operation well.

Obviously, patients with serious cardio-vascular lesions, renal disease, or severe diabetes should never be submitted to the operation. Tuberculosis in other parts, especially intestine, kidneys, bone and joints, is generally accepted as a contra-indication. Moderate laryngeal lesions are permissible.

The chief indications for operation are as follows: (1) Fibrotic disease with mediastinal displacement, dyspnœa and cardiac embarrassment often being secondary thereto. (2) Unsatisfactory pneumothorax. (3) Contracting pneumothorax cavity with recrudescence of the symptoms. (4) Following artificial pneumothorax treatment which has been successful, but in which symptoms and signs have recurred after treatment has been abandoned for some time. (The pleuræ are generally adherent.) (5) Certain cases of long standing, with persistent cavitation. (6) Certain cases of spontaneous pneumothorax in which the acute symptoms have settled, but in which there is a persistent reaccumulation of fluid in the pleural cavity; these cases tend to become secondarily infected. In four cases of this type excellent results have been obtained, the lung generally coming out to the collapsed chest-wall. (7) Secondarily infected pyopneumothorax cases which have been drained should not be left too long if thoracoplasty is proposed. In one case in which thoracoplasty was performed the patient succumbed two and a half months later from lardaceous disease, which, although unrecognizable, was probably present prior

to operation. (8) Recurrent hæmoptysis resistant to other forms of treatment.

The general points of pre-operative and post-operative treatment will not be discussed here except to point out the necessity for a continuous period of control for three to six months in a sanatorium or similar institution, following as soon as possible on operation.

The surgical treatment of pulmonary tuberculosis can, by its published results, justify a further extension of its use as a valuable form of therapy, and, as experience is gained and indications become more defined, will be more regularly employed not only to the satisfaction of those in medical charge of such patients, but to the advantage of the community.

GYMNASTIC EXERCISES IN THE TREATMENT OF PULMONARY TUBERCULOSIS.

By FILIP SYLVAN,

M.D. (DAVOS).

In the treatment of tuberculosis two different lines may be followed. The one is to strengthen the body in order to increase the resistance power of the patient, so that he can overcome the disease. The other is to kill the bacilli by means of some vaccine or serum. The first line has been rather neglected, but by developing it, I believe that we shall be much more successful in fighting tuberculosis.

First of all, it must be quite clear in our own minds in what special way the tuberculous patient needs to be strengthened. We know that a certain predisposition to the disease must be present before tuberculosis can develop. Long ago Hutchinson[1] showed that people with weakened respiration were more liable to develop consumption. Vital capacity and respiratory power have always decreased together in consumptive patients. Many writers point out the importance of good circulation for tuberculous patients. Galecki[2] found that a frequent and soft pulse was to be taken as a sign of a bad prognosis, and that if a patient improved, the pulse became less frequent and harder. A frequent and soft pulse is always a sign of weakness of bloodvessels and bad circulation. Robin[3] found that increased demineralization was a preliminary symptom of tuberculosis. These are, in my opinion, the chief symptoms of a disposition to tuberculosis.[4] The most important thing is to find agents which will arrest the tuberculous disease.

Physical exercises take the first place among agents of proved

benefit. They may, however, do more harm than good if employed ignorantly. It is therefore necessary to know which exercises are beneficial and which are to be considered harmful, and also how each form of exercise is to be employed, so that the patient derives the fullest benefit. For this purpose it is necessary to use a scientific system of exercises. P. H. Ling's system (Swedish gymnastics) is admirably fitted for our purpose, and especially those simple exercises which employ only one group of muscles with resistance at a time; these are certainly the most useful.

I must here emphasize that all tuberculous individuals are to be viewed as persons who are physically weak, and consequently only very easy exercises must be ordered. Most of the exercises usually employed in Swedish drill are harmful to consumptive patients. The technique of gymnastic treatment is very important and must be learnt practically. I have during many years tested which exercises are beneficial and which are to be considered harmful for consumptives in their different stages. All exercises which contract the chest are to be counted as harmful, also exercises which employ several groups of muscles simultaneously. There are several rules and principles which I will mention which we must carefully follow if we are to be successful.

In many places graduated work has been advised and used for tuberculous patients, and while I do not consider such a desirable course of treatment for active cases of tuberculosis, I highly appreciate it for keeping up the muscular strength of the patient, in which the disease has been arrested. Graduated work has hardly any beneficial influence on respiration and circulation, and consequently is of little or no therapeutic value, but in conjunction with gymnastic treatment it would be of great value to improve the patient's strength and working ability when wisely supervised in "cured" cases. Of course, gymnastic exercises have therapeutic value only when used so that they improve respiration and circulation that is in accordance with the rules and principles I will now describe.

The weakness of respiration which we find in all consumptive patients is, in my opinion, due to weakness of the inspiratory centre in the frontal lobe of the cortex.[5] We can strengthen this centre by inhaling simultaneously with a resistance exercise.[6] By repeating this inhalation with different exercises respiration gradually improves and vital capacity and respiratory power increases. The inspiration, however, must not be very deep—certainly not as deep as possible, for that would be too strenuous for a weak lung: it should be only just a little deeper than usual. Very soon shortness of breath disappears, and the patient can walk uphill much more easily. After a fortnight the vital capacity increases 200-300 c.c., in many cases even 400-500 c.c.

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In many places graduated work has been advised and used for tuberculous patients, and while I do not consider such a desirable course of treatment for active cases of tuberculosis, I highly appreciate it for keeping up the muscular strength of the patient, in which the disease has been arrested. Graduated work has hardly any beneficial influence on respiration and circulation, and consequently is of little or no therapeutic value, but in conjunction with gymnastic treatment it would be of great value to improve the patient's strength and working ability when wisely supervised in "cured" cases. Of course, gymnastic exercises have therapeutic value only when used so that they improve respiration and circulation that is in accordance with the rules and principles I will now describe.

The weakness of respiration which we find in all consumptive patients is, in my opinion, due to weakness of the inspiratory centre in the frontal lobe of the cortex.[5] We can strengthen this centre by inhaling simultaneously with a resistance exercise.[6] By repeating this inhalation with different exercises respiration gradually improves and vital capacity and respiratory power increases. The inspiration, however, must not be very deep—certainly not as deep as possible, for that would be too strenuous for a weak lung: it should be only just a little deeper than usual. Very soon shortness of breath disappears, and the patient can walk uphill much more easily. After a fortnight the vital capacity increases 200-300 c.c., in many cases even 400-500 c.c.

That physical exercises are beneficial for improving the circulation is well known, but in this matter there is a great difference between the results observed in a healthy person and those seen in a patient suffering from an illness like tuberculosis. It is not only the amount, or the dose, of physical exercise which must be different, it is the kind of physical exercise and the way to use it which is altogether different in the case of a healthy and that of a sick person. Healthy persons may go in for sports, but for most sick people sports would do more harm than good: and this is especially the case for tuberculous patients. Certainly for many tuberculous patients, in early stages, such easy sports as skating or tobogganing may do good if carried out carefully. But for most tuberculous patients only a scientific system of well-tested exercises, specially suited to improve circulation in weak and delicate persons, is justified.

The most important method whereby the circulation can be improved is by strengthening the centre for blood distribution, situated in the frontal lobe of the cortex.[7] While the muscles are exercising the flow of blood to the whole muscular system is increased, and not only when all the muscles are in action, but also when only one group is working. As soon as the person is tired or ill, the augmentation of the flow of blood is arrested, so that the current is reversed and there is a decrease of the flow towards the muscles, which then becomes even less than in a state of rest.

It is easy to understand that muscular effort must be harmful under such circumstances. In the same way the flow of blood to all other organs is regulated in accordance with special laws. If the centre of the blood distribution becomes weaker, the blood-supply is reversed all the quicker; then the patient can only do less physical exercises without damage to his health. If this centre is strengthened, exercises such as walking or light winter sports is so much the easier. It has been proved by experience, and by experiments,[7] that if, for example, one arm works until it is tired (reflux of the blood-supply) and then immediately the other arm starts working, the supply of blood becomes normal instantaneously. If this arm works until the reflux of blood has begun, and if then a leg starts working, the blood-supply at once becomes normal again. In this manner one may work with one group of muscles after another without interference with the blood-supply. Thus also the centre of the blood-supply is exercised and strengthened. As soon as the centre of the blood-supply is sufficiently strengthened the patient can start work, even if the lung is not healed. I have observed in many cases that the healing of the lung advanced more rapidly after the patient had started work. Of course, instead of work a patient can use sports, which have the same effect on the body. Fitness for work depends much more on the state of the centre of the

blood-supply than on the state of the lung. If the patient starts gymnastic treatment when his pulmonary tuberculosis is first diagnosed, I always allow him to continue his work, and the results are almost invariably good. To breathe well during all exercises is of the greatest importance, as muscular effort without sufficient breath is very harmful for the circulation, as shown both by Weber[7] and Kolb.[8]

I should like to draw attention to the fact that in many cases persons developed tuberculosis after having practised swimming under the water rather energetically.

For a patient with acute tuberculous trouble accompanied by a high temperature I do not think exercises are advisable, but in cases with a chronic high temperature—say, of 38-39° C.—there need be no contraindication for easy gymnastic exercises. We must remember that such exercises have quite a different effect to walking or sport. When carried out in the right way these can be beneficial for a patient in bed. Naturally one has to be very careful in such cases, and no one without long training and much experience should administer such treatment to a feverish patient. In all such cases vibrations on the chest are very important to accelerate the lymph circulation. Stagnant lymph fluid is a good soil for the growth of germs, and therefore I use vibrations on the chest for all lung patients. If a patient has high fever, I give vibrations twice a day. As soon as the patient is better, I give less vibrations and more exercises. If the temperature is in the afternoon about 38° C. or even 38·5° C., usually after a few weeks it becomes normal. The too-frequent pulse becomes gradually less frequent and harder, always a sign that the bloodvessels are stronger and the circulation better, and the patient has consequently the greatest prospect of recovery.

The results with patients which I demonstrated in London at the Royal Society of Medicine (Clinical Section) before and after gymnastic treatment in 1913-14, as well as the results I have now had during fifteen years with gymnastic treatment for patients with pulmonary tuberculosis, I consider most encouraging.[9] Of 200 patients whom I treated in 1919-21, all who were in the first stage were "cured" and fit for a return to the same work as that in which they had been engaged before their illness. Of patients in the second stage, all were "cured" and fit for work. A few cases who continued the treatment less than two months I have not included in my returns. Of patients in the third stage, 32 per cent. became fit for easy work.

We all know how few patients who have been under treatment in sanatoria are able to go back to their former work. All patients, however, whom I treated from the beginning of their illness not only went back to their former work, but continued work while under treatment, and yet the cure was not interfered with. I have had stone-

workers whose pulmonary tuberculosis was diagnosed independently by several medical men and also by X-ray examinations who came to me for treatment in the afternoons when they had finished their work, and they were "cured" without giving up their work even for a day.

Although treatment by gymnastic exercises must be considered comparatively new, and seem to many, perhaps, a little strenuous, I feel it is worth while to draw the attention of medical advisers to it. I have found pulmonary tuberculosis to be most responsive to wisely supervised gymnastic treatment, and the improvement of the patient goes on so regularly, especially in the early stages, that after the first examination I feel I am able to tell the patient how long a time it will take to cure him. With very few exceptions the results appear to have justified my views.

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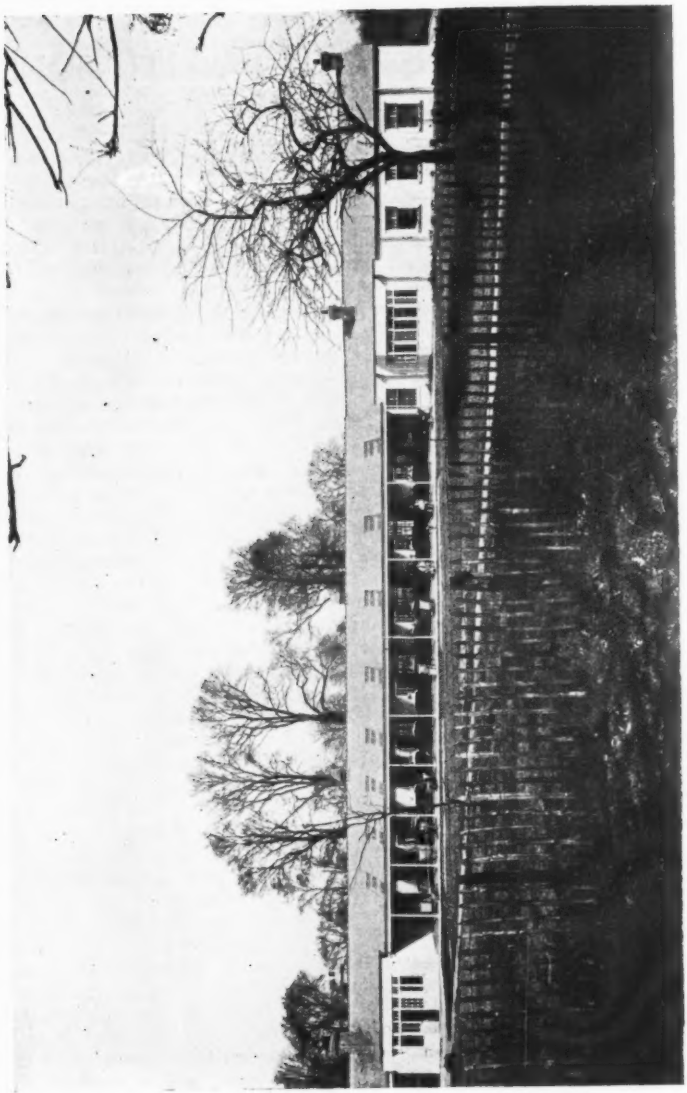
9 See Proceedings of Royal Society of Medicine, London, 1913-14.

ASSOCIATIONS AND INSTITUTIONS.

THE OSLER PAVILION, OXFORD.

Mr. A. G. E. Sanctuary, M.A., Administrator of the Radcliffe Infirmary and County Hospital, Oxford, in collaboration with Dr. William Stobie, Hon. Assistant Physician to the Osler Pavilion for Tuberculous Cases, has kindly favoured us with the following account of the new Osler Pavilion at Oxford.

In 1910 Sir William Osler and Miss Mabel Price inaugurated a campaign against tuberculosis in Oxford and in its neighbourhood. The Oxfordshire Association for the Prevention of Tuberculosis was formed as a result, and dispensaries were established in various towns within a thirty-mile radius of Oxford. This was the first attempt in the British Isles to apply Sir Robert Philip's methods of dealing with tuberculosis to country areas. Dr. William Stobie, recently arrived from Edinburgh, was appointed medical officer to the Association, and thanks to the whole-hearted co-operation of the local medical profession the scheme proved so satisfactory that when the National Insurance Act came into being in 1912 it formed the basis of the Astor Report, and was adopted by the various local authorities throughout the country. Up till shortly after the outbreak of war the Oxfordshire Association for the Prevention of Tuberculosis continued to carry on the work on behalf of the city and county of Oxford. About that time the Association became affiliated to the Red Cross as an after-care committee, and the local authorities became directly responsible for the work. It had always been Sir William Osler's wish to have the residential treatment linked up with the general hospital. This has at last been made possible by the foresight of the treasurer of the Radcliffe Infirmary and his committee, who, shortly after the termination of the war, purchased an old manor-house and over 100 acres of land on high ground at Headington, about two miles from the centre of the city. Plans were drawn up by Mr. W. H. Castle in collaboration with the Ministry of Health, who sanctioned a grant in aid of the capital expenditure on the buildings. Before the work could be started, however, the Geddes Economy Committee temporarily put a stop to all new expenditure of the kind in question, and it was not until the autumn of 1925 that the work could be commenced. The buildings consist of: (1) A long one-storeyed pavilion facing south and containing forty beds; (2) a dining-room and kitchen block; (3) a treatment block. The Pavilion is divided into two halves by a centrally placed nurses' duty-room, which commands a view of the balconies on either side. One half is occupied by men and the other by women, and each contains four single rooms, four double rooms, and a ward of eight beds. The single and double rooms, which are intended for the more seriously ill patients, open out on to a wide covered verandah. At the extreme ends of each wing are the wards, and on either side of the corridor connecting the wards with the verandahs are the day-rooms



THE OSLER PAVILION, OXFORD.

and the bathrooms, the former facing south and the latter north, with sanitary annexes built out from them to the north. In front of the Pavilion stretches a beautifully timbered park. This building is connected by a covered corridor to the dining-room and kitchen block, which is situated to the north of it, and contains sufficient room and equipment for twice the number of patients at present accommodated. The treatment block stands rather closer to the Pavilion and east of the kitchen block, and contains an X-ray room, operating theatre, anæsthetic room, pathological room, and light-treatment room; it too is connected to the Pavilion by a covered corridor. The nursing staff is lodged in the old manor-house, which stands in its own grounds about 100 yards south-east of the Pavilion. The foundation stone was laid most appropriately by Lady Osler in September, 1925, and the Pavilion was formally opened by the Minister of Health, the Right Hon. Neville Chamberlain, on January 28, 1927. Forming as it does a part of the general hospital, the inestimable advantages of close association with the various departments is obvious. The medical staff consists of an hon. physician, who is also senior physician to the Radcliffe Infirmary and so forms a connecting link with the staff of the hospital, an hon. assistant physician (the original medical officer of the Oxfordshire Association for the Prevention of Tuberculosis), and a resident medical officer. The Pavilion is administered and staffed as regards nurses from the main hospital, a most efficient and satisfactory method, and forms part of the teaching department for the medical school, with whose laboratories it is in happy association. With all these advantages it is unthinkable that in time there will not be produced at the Osler Pavilion work worthy of the great chief whose name it bears.

THE OSLER PAVILION, OXFORD.

The National Association for the Prevention of Tuberculosis has just issued an artistically produced illustrated Report of Council, which was presented at the recent twenty-eighth Annual Meeting. A portrait of the Prince of Wales, President of the Association, appears as frontispiece, and there are a number of charts and illustrations of special interest. A copy of the Report may be obtained on application to Headquarters, 19, Tavistock Square, W.C. 1.

The Research Department of the National Jewish Hospital at Denver, Colorado, has for some years rendered valuable service by the issue of "Contributions to the Study of Tuberculosis." Vol. VII. has just reached us. Among the contents are articles on "The Centenary of the Death of René Théophile Hyacinthe Laënnec," and "The Centenary of the Birth of Herman Brehmer," by Dr. H. J. Corper, together with a series of suggestive research contributions, and a number of Papers dealing with various clinical features of tuberculous cases.

NOTICES OF BOOKS.

A TREATISE ON X RAYS.

MESSRS. V. E. PULLIN and W. J. Wiltshire, colleagues in the Research Department at Woolwich, have been well advised to provide a volume which is at once a chronicle of the beginnings and the evolution of X rays, and an explanation of the means by which they are produced and the uses to which they have been put.[1] Their preface states that the book is intended for the layman rather than the scientist, and the authors have set themselves to give, in language that anyone with an elementary knowledge of physics can understand, a clear account of a subject which has been hitherto almost hidden from the uninitiated. The result is a most readable and interesting book, which fulfils its authors' purpose, and will also inevitably find its way into the hands of every physicist, and will take a permanent place in the scientific library. The story is told of the early experiments which culminated in Röntgen's discovery, and then one after another are recorded the advances made in the construction of apparatus, and the observations of the many brilliant minds which devoted themselves to the elucidation of the newly discovered physical facts, and led to the far-reaching deductions made from them. To many the most fascinating chapters will be those relating to the structure of the atom and the genesis of the rays. The uses of X rays in medicine are concisely summarized, and their applications in the laboratory and the workshop are described. Of particular interest is the account of the difficulties and achievements in the examination of war materials and steel castings in the Department at Woolwich. Many helpful illustrations and diagrams accompany the text. When a second edition is called for, it would add still more to the value of the book if a chapter might be included on the work done in this connection at the National Physical Laboratory.

J. E. A. LYNHAM, M.D.

TUBERCULOSIS OF LUNGS AND SEROUS MEMBRANES.

Dr. Prevost has contributed to the series "Les Consultations Journalières" a manual which presents in an efficient and clear manner the various problems which arise in the diagnosis, symptomatology, and treatment of tuberculosis, as it principally affects the lungs and pleura.[2] The work is illustrated by sixteen full-page and thirty-three textual figures, many of them being reproductions of X-ray radiographs.

[1] "X-Rays, Past and Present," by V. E. Pullin, Director of Radiological Research, Research Department, Woolwich; and W. J. Wiltshire, Research Department, Woolwich. Pp. 229, with 43 illustrations. London: Ernest Benn, Ltd., Bouverie House, Fleet Street, E.C. 1927. Price 12s. 6d. net.

[2] "Tuberculose pulmonaire et Tuberculose des Séreuses," by Dr. Pierre Prevost, Physician to the Hospitaux de Paris and Sanatorium de Villepinte. Pp. 448, with 6 plates and 33 figs. Paris: Gaston, Doin et Cie., 8, Place de l'Odéon. 1927. Price 30 francs.

The contents are divided into two parts. The first deals with diagnostic problems and their therapeutic implications; also with questions of prognosis, sociological matters, and the more general lines of treatment, which aim at (1) destruction of the bacillus; (2) improving the soil resistance; (3) focal reactions. The special indications and the technique necessary for phrenicotomy, pneumothorax, oleothorax, thoracoplasty are briefly indicated. Therapeutic considerations are discussed; on sanocrysin the writer suspends judgment. Part II. is devoted to tuberculosis of the pleura and peritoneum. An appendix provides a useful list of French institutions available for the treatment of tuberculous patients, and classified under public and private sanatoria, hospitals, and preventoria (for preventive treatment of the young of both sexes). The volume forms a useful and practical guide for practitioners.

G. B. PRICE, M.D.

X RAYS IN SURGERY AND RADIATION THERAPY.

Dr. Kurtzahn, of Konigsberg, has recently written a serviceable little book, which gives in a compressed form the principles of X-ray diagnosis.[1] It is written chiefly for surgeons. There are some thirty pages on the physics of X rays, with many useful hints on tubes and apparatus. The section on bones is naturally the longest, and in a short space the author ably describes the chief points in the radiological diagnosis of fractures and diseases of bones. The renal and digestive tracts are not so detailed, but a good deal of useful information is given, and special attention is paid to the surgical technique of pneumoperitoneum, encephalography, and myelography. The appendix on X-ray and radium therapy is valuable, for the author has sifted the wheat from the chaff and set out in a clear manner all that is worth knowing on these subjects. Only those diseases are described which are known definitely to be benefited by radiation therapy, and the technique of administration is put forward very simply. Not the least advantage of this book is the fact that it is written in very easy German, and it can be recommended to everyone who wishes to get a sound and unbiassed knowledge of the principles underlying X-ray diagnosis and treatment. The author has missed very little, and the amount of information comprised in so small a volume is amazing. There are 110 excellent illustrations.

P. J. KERLEY, M.B.

THE ALPINE CLIMATE OF AROSA.

Arosa is situated at an altitude of about 1,850 metres in the Swiss Alps, its exact position being 46°47 north and 9°40 east. Dr. Götz has just published detailed records regarding various groups of rays from the sun and sky taken at Arosa during the past few years with standard technique, some of it quite recently introduced.[2] Such detailed observations as those recorded may prove of great value to the medical world when the exact part played by ultra-violet and other radiations in the

[1] "Chirurgische Röntgenologie," by Dr. Hans Kurtzahn. Pp. 216. Berlin: Urban und Schwarzenberg. 1927.

[2] "Sun's Radiation at Arosa" ("Das Strahlungsklima von Arosa"), by Dr. F. W. Paul Götz of the Arosa Observatory. Pp. 110, with 31 figs. and 69 tables. Berlin: Julius Springer. 1926. Price, Reichsmark 8.70.

process of healing and cure is better understood. At present the treatise is of first importance to physicists and others interested in radiation for its own sake. Dr. Götz does not completely ignore the other factors concerned in the climate of Arosa, and gives interesting synopses regarding wind, temperature, cooling power, humidity, drying power, vapour pressure, clouds, rain, and snow. The records of cooling power taken with Dr. Leonard Hill's Kata-thermometer are important, since many consider that the combination of cool open air and sunshine plays a great part in the cure of surgical tuberculosis. The text is in German, and is illustrated with photos, graphs, and tables; there is also a serviceable bibliography.

J. Argyll Campbell, M.D., D.Sc.

THE CURATIVE TREATMENT OF ASTHMA.

Dr. Paul Cantonnet has written a small booklet setting forth the results of a treatment which he has adopted for asthma during the past twenty years, and which he claims to be curative in almost all cases.[1] He gives a table linking up intoxications and infections with the production of arthritism, carrying this on through effects on nutrition and the liver to disturbances of the autonomic system and ductless glands on the one hand, and through "proteopexic insufficiency" causing local and general shock on the other, till, finally, the asthmatic crisis is reached. The field through which the author travels is so wide and involved that it would be difficult to dispute, or even to accept, many of his conclusions. The keynote of the treatment consists of intragluteal daily injections of 3 per cent. iodized peptone, with not more than $\frac{2}{3}$ c.c. calcium chloride, and tiny doses of jaborandi, continued for twenty-five days, and supplemented where necessary by subglottic intratracheal injections of gomenol, eucalyptol, thymol, etc., or by a nasal spray of these aromatic oils in combination with ether, cajaput, and belladonna. Vaccines to combat pulmonary and intestinal infections, a careful diet, and "decholesterinisation" are further recommended. The author rejects the use of adrenalin as being merely symptomatic, and asserts that, by patience and the careful administration of the above principal and accessory remedies, asthma becomes amenable to treament in the great majority of cases.

J. F. Halls Dally, M.D.

PULMONARY TUBERCULOSIS.

Dr. G. T. Hebert opens the Preface to his admirable manual on tuberculosis of the lungs with the following words:[2] "The establishment by the Ministry of Health and local authorities of special centres for the diagnosis, treatment, and prevention of tuberculosis has resulted in a very considerable reduction in the number of tuberculous patients attending the general hospitals. The student now has relatively few

[1] "Traitement Curatif de l'Asthme," by Dr. Paul Cantonnet, pp. 100. Paris: N. Maloine, 27, Rue de l'Ecole de Médecine, 1927. Price 4 francs.

[2] "Pulmonary Tuberculosis," by G. T. Hebert, M.A., M.D., M.R.C.P. Physician in Charge of the Tuberculosis Department, St. Thomas's Hospital. Pp. vii + 212, with 5 figs. London: Edward Arnold, 41 and 43, Maddox Street, W. 1. 1927. Price 7s. 6d.

opportunities during his ordinary curriculum for studying this important and prevalent disease." This is indeed the case, and merits serious consideration. Something like a quarter of all deaths of citizens at the home-making, child-rearing period of life die from consumption. In England and Wales at least 200,000 of the population are subjects of active pulmonary tuberculosis, and over 30,000 die every year from the disease. And yet comparatively few of our coming medical practitioners are receiving adequate clinical training in the early recognition and prompt treatment of intrathoracic tuberculosis. If consumption is to be effectively dealt with it must be by securing the effective co-operation of the panel doctor and other medical advisers engaged in general practice. Dr. Hebert's manual is an ideal guide to the clinical study of pulmonary tuberculosis. It is based on extensive clinical experience of the disease and sound knowledge regarding the requirements of the student and young practitioner. We could wish that his serviceable handbook might be placed in the hands of every medical practitioner who is called to deal with consumptive cases. All tuberculosis officers should make a point of reading the volume. It is the most concise, comprehensive, informing, and helpful of the many volumes on the subject which have recently been published. It is essentially a clinician's guide, providing a particularly lucid and practical exposition of symptomatology, X-ray and special examinations, and all objective signs. There are special chapters on hæmoptysis and pleurisy, pleural effusion and pneumothorax, fibrosis, the evaluation of evidence, tuberculosis in children, and differential diagnosis. The concluding chapter deals with treatment and administration. The book is splendidly arranged and there are suggestive tables and diagrams. We have nothing but praise for this compact, clearly presented, well-balanced, judiciously expressed, dogmatic exposition of all essential points relating to the practical clinical investigation of cases of pulmonary tuberculosis.

A TRUDEAU FOUNDATION TUBERCULOSIS STUDY.

The second volume of the Trudeau Foundation Studies is a worthy contribution to the memorial to Edward Livingstone Trudeau, founder of the Trudeau Sanatorium at Saranac.[1] In it Drs. E. R. Baldwin, S. A. Petroff, and L. V. Gardner present the results of their experience in connection with the work of the Saranac and Trudeau laboratories, and they express the hope that the volume will find a place as a text-book for special students of tuberculosis. The work is certainly one which should appeal to all technicians engaged in the investigation of tuberculosis by means of laboratory methods. It will be of interest to clinicians, and especially such as are tuberculosis officers, and who realize the importance of pathological, bacteriological, and biochemical enquiries and the need for epidemiological studies and experimental therapy if the tuberculosis problem is to be understood and measures

[1] "Tuberculosis: Bacteriology, Pathology, and Laboratory Diagnoses, with sections on Immunology, Epidemiology, Prophylaxis, and Experimental Therapy," by Edward R Baldwin, M.D., Director of the Trudeau Foundation; S. A. Petroff, Ph.D., Bacteriologist and Director of Trudeau Sanatorium Research and Clinical Laboratory; and Lefroy V. Gardner, M.D., Pathologist and Director of Saranac Laboratory for the Study of Tuberculosis, Saranac Lake, New York. Pp. 342, with 4 coloured plates and 82 engravings. London: Baillière, Tindall and Cox. 1927. Price 21s.

discovered for securing the prevention and arrest of tuberculous disease. The technical methods described in this comprehensive volume have been thoroughly tested in the Saranac Laboratory established in 1894, and in the Trudeau Sanatorium Laboratory established in 1909, now jointly operated by the Trudeau Foundation as teaching and research institutions, in addition to their fundamental functions as clinical laboratories. Sanatoria in considerable numbers are being established in this and other countries, but in connection with most of these institutions the provision for reliable research work leaves much to be desired. The authors of the fine volume which lies before us rightly point out that present-day refinements of diagnosis and experimental work make such a volume as this most desirable. The need has now been admirably met. The work is not intended to be an exhaustive treatise on bacteriological technique, but it will prove invaluable to teachers, students, laboratory investigators, technicians, tuberculosis officers, and other workers in tuberculosis institutions. There are excellent chapters dealing with experimental pathology, predisposition, infection, immunology, epidemiology, prophylaxis, and experimental therapy. A thoroughly practical account is given of the tubercle bacillus and other acid-resisting bacteria. A special chapter is devoted to the various forms of tuberculosis. A particularly practical chapter is allotted to diagnostic methods The volume is effectively illustrated with coloured plates, reproductions of photographs, graphs, charts, and other figures. There is an index of authors and an index of subjects. At the end of each chapter are bibliographical references. This necessarily short notice will, we trust, be sufficient to indicate that from Saranac Lake has been issued a notable volume which no serious investigator of tuberculosis can afford to neglect.

THE HOUSING PROBLEM.

Colonel Fremantle has rendered public health and the community generally a valuable service by the issue of an admirable medico-sociological study of the housing problem.[1] Tuberculosis is in great measure a question of housing, and certainly all medical officers of health, tuberculosis officers, Members of Parliament, and those connected with the work of local authorities, as well as every thoughtful man and woman interested in home-making and human betterment, should study Colonel Fremantle's comprehensive, concise, and informing book. Its appearance is opportune, for it provides a reliable review of the history and progress of housing during recent difficult years, and indicates lines for future progress. The various schemes for dealing with housing before and since the war are lucidly explained, and the future housing programme is outlined. There are descriptions of existing slums and insanitary houses; data relating to economic aspects, especially costs and rents; particulars of types for new forms of construction; notes on distribution of houses; and chapters on housing and the countryside, garden cities, and housing in Scotland. An appendix contains tables indicating the annual increase in the

[1] "The Housing of the Nation," by Lieut.-Colonel F. E. Fremantle, M.P., F.R.C.P., F.R.C S., D.P.H., Consulting County Medical Officer of Health for Hertfordshire. With a Foreword by the Right Hon. Neville Chamberlain, M.P., Minister of Health. Pp. xiv + 193. London: Philip Allan and Co., Ltd., 5, Quality Court, Chancery Lane, W.C. 2. 1927. Price 8s. 6d.

number of houses, information as to housing through charitable agencies, and work accomplished by local authorities. There is also a serviceable bibliography. As the Minister of Health points out in his sympathetic foreword, Colonel Fremantle's book is an invaluable source of information and guidance. Certainly every housing reformer and true patriot should study this revealing work, which shows that "over the whole country one-tenth of the population live in dwellings overcrowded to the extent of two per room." Tuberculosis will continue to take its heavy toll until this sorry condition of affairs is altered.

RESPIRATION AND ATMOSPHERE.

Dr. James Kerr has prepared an informing little book on the Atmosphere and Respiration, which, although primarily intended for thoughtful members of the general community who cannot claim to have had a scientific training and yet desire information regarding the air we breathe, is also one which medical officers of health, and particularly tuberculosis officers, can be recommended to study.[1] It is one of the manuals in the excellent series of "Modern Health Books," edited by Professor D. Fraser Harris, M.D. Dr. Kerr has condensed into two chapters much interesting and serviceable information regarding respiration under both normal and abnormal atmospheric conditions. There are also sections on atmospheric pollution with dust and smoke and methods of ventilation, and means for the removal of bodily heat and regulation of humidity. Helpful suggestions are given regarding the heating of buildings and the avoidance of colds and chills. The concluding chapter deals with atmospheric radiations.

MANUALS FOR MEDICAL ADVISERS AND WORKS OF REFERENCE.

Mrs. Cecil Chesterton's vivid, picturesque, and terrible record of her personal adventures as a friendless, penniless, inexperienced wanderer in London's mean streets, lodging and doss houses is a book which every student of social problems and worker for human betterment should read from cover to cover.[2] It is a startling revelation of the underworld of London, with fascinating sketches of vagabonds, prostitutes, homeless drifters, unemployed and unemployable women of all ages, hopeless and helpless outcasts, prodigals and adventurers. Mrs. Chesterton provides intensely interesting accounts of her experiences in Salvation Army shelters, homes conducted by Sisters of Mercy, various lodging-houses conducted under philanthropic, religious, and community auspices, and common doss-houses where ordinary cleanliness and hygienic necessities are impossible. The work is presented with real journalistic skill, and is as appealing as a novel. Already the book has passed through several editions, has been widely discussed,

[1] "The Air We Breathe," by James Kerr, M.A., M D., D.P.H., Consulting Medical Officer, London County Council, etc. Pp. 191, with 12 figs. London: Faber and Gwyer, Ltd., The Scientific Press, Russell Square, W.C. 1926. Price 3s. 6d.

[2] "In Darkest London," by Mrs. Cecil Chesterton. Fourth edition with a new appendix. Pp. 258, with portrait frontispiece. London: Stanley Paul and Co., Ltd. 1927. Price 2s. 6d.

and has led to the adoption of practical measures. Mrs. Chesterton's plea for the establishment of women's public lodging-houses has led to the establishment of Cecil Houses Incorporated and a fund with representative officers and central offices at 8, Polebrook House, Golden Square, W. The first women's public lodging-house has been established at 35, Devonshire Street, Theobald's Road, W.C., at a cost estimated at £5,000. It is to be feared that filthy lodging-houses and many of those who are to be found in such places are influential in the spread of tuberculosis.

Dr. Robert Hutchison has been well advised to issue his lectures on elementary therapeutics as given at the London Hospital in book form, for it will not only prove of service to his old students, but can be warmly recommended to young practitioners.[1] In a series of twenty-two concise chapters the fundamental points in the treatment of ordinary diseases and troublesome symptoms are succinctly but lucidly explained. There are numerous helpful prescriptions. Dr. T. A. Ross provides a rational and serviceable section on Psychotherapy, and Dr. Devereux Forrest has written a timely section on Diabetes and the Use of Insulin. Dr. Hutchison's unpretentious little book is an admirable introduction to therapeutics, and should have a place on every general practitioner's bookshelf.

Dr. W. Bolton Tomson has just published an informing and suggestive brochure on the Grancher System as a means for securing the protection of poor and delicate children from tuberculous infection.[2] The work is a plea for the boarding out of physically defective and tuberculously disposed children. Into small space is condensed an excellent account of the Grancher System, and valuable suggestions are presented for the carrying out of a somewhat similar system for young children in this country. All interested in the protection of infants and children from tuberculosis in their own homes and from their own parents and friends should study Dr. Tomson's timely booklet.

The last report of the Committee for the Investigation of Atmospheric Pollution contains data and records of researches which will be of interest to many readers of this journal. We would direct special attention to the description of investigations in which an attempt has been made to correlate the obstruction of ultra-violet radiation with the quantity of suspended impurity in the atmosphere.[3]

A new and eighth fully-revised edition of Baedeker's guide to Great Britain has just been issued.[4] It is a book of reference which in these

[1] "The Elements of Medical Treatment," by Robert Hutchison, M.D., F.R.C.P., Physician to the London Hospital and to the Hospital for Sick Children, Great Ormond Street. Pp. vii + 163. Bristol: John Wright and Sons, Ltd. 1926. Price 7s. 6d.

[2] "The Grancher System for the Prophylaxis of Tuberculosis in Poor Delicate Children," by W. Bolton Tomson, M.D., Medical Superintendent of the Sea-View Sanatorium, St. Leonards-on-Sea, and Vice-Chairman of the Tuberculosis Care Committee for the Borough of Hastings. Pp. 24, with frontispiece. London: Baillière, Tindall and Cox. 1927. Price 1s.

[3] Meteorological Office, Air Ministry—Advisory Committee on Atmospheric Pollution. Report on observations in the year ending March 31, 1926, giving the Twelfth Report of the Committee for the Investigation of Atmospheric Pollution. Pp. 52. London: H.M. Stationery Office. 1926. Price 6s. 6d.

[4] "Great Britain: A Handbook for Travellers," by Karl Baedeker. Eighth revised edition, with 94 maps and plans and a panorama. Pp. lxvi + 696. Leipzig: Karl Baedeker. London: George Allen and Unwin, Ltd., 40 Museum Street W.C. 1. 1927. Price 16s.

days of motoring and general travel will be welcomed by many. Doctors who are often consulted regarding places of residence, health-resorts, educational centres, spas, etc., will find this work of special value in enabling reliable, up-to-date, serviceable information to be given to their clients. The volume is unique, a complete condensed handbook for travellers in all parts of Great Britain. It is plentifully supplied with excellent maps.

We have been favoured with two handsome illustrated volumes descriptive of the "Wellcome Historical Medical Museum" and the "Lister Centenary Exhibition."[1] Both works are charming examples of artistic printing, and contain illustrations of exceptional interest. Mr. Henry S. Wellcome has laid all medicals and others interested in medical history and progress under a debt of gratitude for his gift of these fine books and by his benefactions to medical science.

Dr. A. Niven Robertson, well known as an experienced tuberculosis physician and author of several suggestive works on tuberculosis, is a poet of considerable promise. He has recently written a powerful tragedy descriptive of Highland life which will specially appeal to lovers of Speyside, Rothiemurchus, and the region of the Cairngorms.[2]

A serviceable summary of American teaching and practice regarding the use of digitalis has just been issued and deserves the consideration of clinicians dealing with chest cases in this country.[3]

Medical questions nowadays frequently occupy a prominent place in fiction and dramatic presentations, and it is well that this should be so, for the science and art of medicine is concerned in some form or other with almost all the problems of life. This is very true when we come to consider the life of the consumptive. We are glad, therefore, to direct attention to an optimistic, sympathetic, instructive, and picturesque novel by Dr. C. H. Lerrigo.[4] It is evidently based on personal experience, and brings a message of courage for those "taking the cure." The story deals with the thoughts and experiences of a consumptive, and life under sanatorium conditions. It is an exposure of the evils of quackery. Dr. Lerrigo's work is primarily addressed to American readers, but it also deserves to be read by tuberculous patients striving for recovery on both sides of the Atlantic. The novel, which is dedicated to "the memory of Dr. Edward Livingstone Trudeau, undaunted apostle of hope and cheer," will be appreciated by doctors and nurses engaged in tuberculosis work.

Last year the Faculty of Medicine of the University of Edinburgh held the anniversary of its sixty-first centenary. The University has

[1] "The Wellcome Historical Medical Museum, 54A, Wigmore Street, London." Henry S. Wellcome, Director; L. W. G. Malcolm, M.Sc., F.R.S.E., Conservator. Pp. 118, with illustrations. London: The Wellcome Foundation, Ltd. 1927. "Lister Centenary Exhibition at the Wellcome Historical Medical Museum—Handbook, 1927." Pp. 216, with illustrations. London: 54A, Wigmore Street, W. 1927.

[2] "Nan of Aviemore: A Highland Tragedy," by A. Niven Robertson. Pp. 67. London: Erskine Macdonald, Ltd. 1927. Price 3s. 6d.

[3] "The New Therapeutics of Digitalis: a Résumé of the Latest American Teaching and Practice," by H. E. Matthews, Ph.C., M.P.S. Pp. 14. Bristol: The Matthews Laboratories, Ltd., Clifton Grove. 1927. A copy will be sent post free to medical advisers on application.

[4] "The Castle of Cheer," by Charles Henry Lerrigo, M.D. Executive Secretary, Kansas State Tuberculosis Association. Pp. 304. New York: Offices of the *Journal of the Outdoor Life*, 370, Seventh Avenue. 1925. Price $1.00.

now issued an impressive volume, which is a worthy and permanent record of the great celebration.[1] It contains particulars of the various gatherings, including the commemoration service in St. Giles' Cathedral, Honorary Graduation and Address by Sir George Newman, Corporation Reception, and various dinners and luncheons. This unique volume will be of the greatest interest to all medical graduates of the University of Edinburgh.

The New York Tuberculosis and Health Association, Inc., 244, Madison Avenue, New York, has issued in pamphlet form the Hermann M. Biggs Memorial Tuberculosis Lecture, "A Survey of Some Broad Phases of Tuberculosis," by William H. Park, M.D., LL.D., D.Sc., Director of the Bureau of Laboratories of the Department of Health, New York City.

No. 43 of the Reports on Public Health and Medical Subjects, issued by the Ministry of Health, contains a full account of methods for the recognition of sulphur dioxide in foods.[2]

The firm of Ajax Ltd. has recently issued a handsome, elaborately illustrated guide to ultra-violet radiation which contains a serviceable glossary of terms employed in actinotherapy.[3] Much general information is given and details of technic explained. There is a tabulated list of maladies for which artificial sunlight treatment has been considered serviceable. Particulars are provided regarding the various forms of "Ajax" equipment. There is also a useful bibliography.

Messrs. Chance Brothers and Co., Ltd., have issued an illustrated pamphlet regarding "Vita-Glass," which permits the passage of the sun's beneficent ultra-violet rays.[4]

"The Medical Annual for 1927" fully maintains its position as an indispensable review of medical progress for all medical practitioners.[5] The work is now in its forty-fifth year. The list of contributors contains thirty-three names. Tuberculosis is dealt with in several sections. Sir Henry Gauvain and Dr. R. G. Bannerman provide an excellent summary of phototherapy with illustrations; Professor W. H. Wynn deals with pulmonary tuberculosis; and Sir W. I. de C. Wheeler with surgical tuberculosis; Dr. C. Thurstan Holland contributes a finely illustrated article on X-ray diagnosis; Professor W. H. Wynn also supplies a timely illustrated review of the present position of pneumonography. There is a serviceable list of sanatoria.

The Charity Organization Society renders medico-sociological workers invaluable service by the yearly issue of its Charities Register and

[1] "The University of Edinburgh: Bicentenary of the Faculty of Medicine, 1726-1926. Records of the Celebration." Pp. vii+124. Edinburgh: Printed for the University, James Thin, 55, South Bridge. 1926.

[2] "The Determination of Sulphur Dioxide in Food," by G. W. Monier-Williams, O.B.E., M.A., Ph.D., F.I.C. Pp. 56. London: H.M. Stationery Office. 1927. Price 1s. 3d.

[3] "Sunlight Treatment: A Concise Guide for the Use of Ultra-Violet Radiation in Actinotherapy." Pp. 71, with illustrations. London: Ajax Ltd., 117, Central Street, E.C. 1. 1927. Price 4s. 6d.

[4] A copy of "Vita-Glass, the New Health-giving Glass which transmits the Vital Rays," can be obtained on application to Chance Brothers and Co., Ltd., Smethwick, Birmingham.

[5] "The Medical Annual: A Year Book of Treatment and Practitioner's Index." Edited by Carey F. Coombs, M.D., F.R.C.P. (Medical), and A. Rendle Short, M.D., B.S., B.Sc., F.R.C.S. (Surgical). Pp. civ+624+161 with 81 plates and 126 figs. Bristol: John Wright and Sons, Ltd. 1927. Price 20s.

Digest.[1] The current volume has been thoroughly revised, and is an indispensable work of reference for all interested in any way with philanthropic institutions serving cases in the Metropolitan area. Particulars are given regarding a number of agencies rendering assistance for consumptive and other tuberculous cases. There is an informing section providing statistical and other data relating to the finance of various charitable institutions. We could wish that the valuable surveys relating to tuberculosis and other medico-sociological problems which appeared in the pre-war issues of the Annual could be revived.

Workers engaged in biochemical researches at Cambridge are now issuing an entertaining periodical which certainly merits its title of *Brighter Biochemistry*, for it contains mirth-compelling contributions in prose and poem and clever illustrations.[2]

The Society for the Prevention and Cure of Consumption in the County of Durham has issued a third edition of Dr. W. Robinson's 11-page tract on consumption. The same author has also provided a 10-page popular booklet on present-day aspects of the tuberculosis problem.[3]

The World's Children,[4] edited by Mr. Edward Fuller, is the official journal of the Save the Children Fund and the English-speaking organ of the Declaration of Geneva. It is a live monthly periodical which merits the sympathetic support of all interested in the international betterment of child life.

Under the title of *Rivista Di Patologia E Clinica della Tubercolosi*, a new periodical has just appeared under the influential editorial direction of a number of Italian professors interested in tuberculosis. The general editor is Professor Gennaro Costantini, 6, Via Dante, Bologna, and the annual subscription is 60 lire. The first number contains an article on pseudo-tuberculosis by Dr. F. Velardi.

We have received from Mr. Gjerløv-Knudsen, architect, of Copenhagen, Denmark, plans and particulars of his ingeniously designed terrace sanatoria, which are specially planned to make the most effective use of sun and air.

[1] "The Annual Charities Register and Digest," being a classified register of charities now available for the Metropolis. Thirty fifth edition. Pp. 31 + viii + xx + 567. London: Longmans, Green and Co., Ltd., and Charity Organization Society, Denison House, Vauxhall Bridge Road, S.W. 1927. Price 8s. 6d.

[2] *Brighter Biochemistry*, being the illustrated Journal of the Biochemical Laboratory, Cambridge, is published at the Sir William Dunn Institute, Cambridge. Price 2s. 6d. each number.

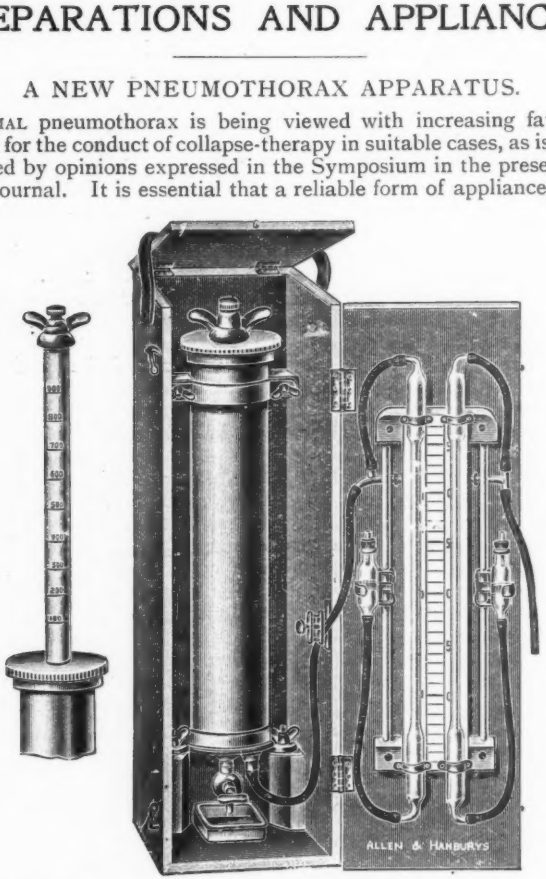
[3] "Consumption: Its Prevention and Cure," Third Edition; and "The Problem of Tuberculosis To-day," both by Dr. W. Robinson. Published by the Society for the Prevention and Cure of Consumption in the County of Durham, 54, John Street, Sunderland.

[4] *The World's Children* is published by the Weardale Press, 26, Gordon Street, W.C. 1. Price 4d. each issue.

PREPARATIONS AND APPLIANCES.

A NEW PNEUMOTHORAX APPARATUS.

ARTIFICIAL pneumothorax is being viewed with increasing favour as a means for the conduct of collapse-therapy in suitable cases, as is clearly evidenced by opinions expressed in the Symposium in the present issue of this Journal. It is essential that a reliable form of appliance should



THE HOLMES-WINGFIELD PNEUMOTHORAX APPARATUS.

be available. Dr. R. C. Wingfield, of the Brompton Hospital Sanatorium at Frimley, Surrey, has favoured us with the following description of a new form of apparatus for the production of artificial pneumothorax. "The following is a short description of a new apparatus designed for me by Miss V. Holmes, B.Sc. An artificial pneumothorax can be induced and maintained by any of the instruments in use at present, and even by home-made ones. For the new appliance no special claim is made save that it is not breakable and that when once it is put in action the whole operation can be completed by the simple opening of one tap, doing away with the necessity of raising and lower-

ing bottles, or using pumps to maintain pressure, or stopping the operation to obtain pressure readings. It consists of a metal cylinder of 1,000 c.c. cubic capacity fitted with a heavy accurately ground hollow piston. The cylinder has a bottom stop-cock, and is filled with air through this by drawing up the piston, the falling weight of which supplies a steady flow of air through another outlet at the base at a pressure of about 50 cm. of water. The piston-cylinder fitting is rendered airtight with castor oil, with which the piston is filled via the piston rod, and which is permitted to flow through bored holes into grooves in the piston. Any excess of castor oil collecting in the conical-shaped sump at the bottom of the cylinder escapes through the stop-cock each time the cylinder is filled, the air outlet being above this level. From the air outlet a rubber tube provided with an instantaneous and a gradual screw clamp runs to the patient via a metal tube on the box lid, from which two side openings are connected to two manometers. The manometer nearest the cylinder is charged with water, that nearest the patient with a mixture of castor oil and oleum caryophylum at a specific gravity of 1,000. The piston rod is graduated to show the cubic content of the cylinder at any level of the piston. The following are the directions for use: The cylinder is filled; a needle is fitted; the instantaneous clamp is opened; and the screw clamp then gradually opened until the water manometer shows the desired pressure at the needle point (about plus ½ cm. of water). The instantaneous clamp is then shut. The needle is introduced into the pleural cavity of the patient, the free fluctuations of the water manometer showing that its point is free. The oil manometer is then set to the mean intra-pleural pressure by squeezing its tube. The instantaneous clamp is then opened and the air is run in until a sufficient quantity has been introduced, or until the mean intra-pleural pressure, as shown by the oil manometer, has reached the desired figure. The oil manometer will show the actual mean intra-pleural pressure at any moment during the operation. The instantaneous clamp is then shut, the screw clamp being left alone, the cylinder is refilled, and with a change of needle the instrument is ready for the next patient, and is operated for the second and all subsequent operations by the instantaneous clamp alone." The accompanying illustration indicates the chief features of the apparatus, which is made by Messrs. Allen and Hanburys, Ltd., Wigmore Street, W. 1.

HYGIENIC APPLIANCES AND THERAPEUTIC PREPARATIONS.

The Bramwell Hygienic Kitchen Table will interest many of our readers.[1] It has been designed and constructed to facilitate the carrying on of cooking and other domestic duties hygienically, effectively, and with a saving of time and labour. The chief features of this cleverly constructed table are shown in the adjoining illustrations. It is primarily intended for the kitchen of the ordinary house, but it will be appreciated in the kitchens of hospitals, sanatoria, nursing homes, and other institutions, and will be found admirable for use in connection with the work of welfare centres, school clinics, dispensaries and the

[1] Particulars regarding the Bramwell Hygienic Table can be obtained on application to the inventor, Miss E. A. Bramwell, Bolton Wilberfoss, York.

like. With a little modification it could be made suitable for service in connection with the work of small laboratories. The table has a

THE BRAMWELL HYGIENIC KITCHEN TABLE.
OPEN—DIMENSIONS, 5 ft. 2 in. × 2 ft.

white porcelain-like central metal tray on which pastry and other food products can be hygienically prepared, and there are folding side wings covered with zinc on which hot dishes, a gas ring, etc., can be placed.

THE BRAMWELL HYGIENIC KITCHEN TABLE.
CLOSED—DIMENSIONS, 2 ft. 7 in. × 2 ft.

The whole table can be readily folded to occupy a small space, and so is portable and convenient for storage when not in use.

Under the title of the PIC-NIC FURNACE there has recently been placed on the market a patented novelty which will appeal to lovers of the open-air life.[1] It will be approved by motorists, caravanners, campers, and others who enjoy picnicking out of doors and desire a portable stove on which to boil their kettle or heat the saucepan. The furnace is handy, portable, and strong, and enables an effective fire to be kindled in a few minutes.

Clothing is now being provided, both for the sound and the sick,

[1] The Pic-nic Furnace is made by the Arthurlie Engineering Company, Barrhead, Glasgow, from whom particulars can be obtained on application. Price 7s. 6d.

which provides for proper exposure to moving air and sunlight. Tuberculous and tuberculously disposed children, as well as adults, should wear garments which permit the ultra-violet rays of natural sunlight to exercise their beneficial influence. Under the designation of the "COMSENSE" SHIRT a hygienic, comfortable, and pleasing dress has been introduced which leaves the throat and part of the front of the chest exposed and free from compression.[1] It is somewhat similar to the shirt worn by Swiss schoolboys and many tourists, but it possesses a detachable and reversible collar. The shirts are available in a variety of washable materials. They are already in use in some schools, and are strongly to be recommended to patients undergoing open-air or sanatorium treatment at home or abroad.

The open-air life has many advantages both for the healthy and the delicate and especially for tuberculous cases, but it cannot be denied that there are certain disadvantages. And among these not the least is the ruin of clothes from the invasion of moths, penetration of dust and exposure to damp, fog, and rain. Under the designation of THE JEKMOTH HOME STORE an ingenious and effective protection has been introduced which many women patients and health travellers will be glad to welcome.[2] It will be invaluable to those who have to reside in tropical climates, or in countries where special care has to be taken to maintain furs and the like in good condition. The "Jekmoth" is an airtight, waterproof bag, fitted with a metal frame. It can be hermetically closed and suspended in hanging cupboards or elsewhere. The bag is obtainable in a variety of shades and with an outer cover of silk or cretonne. When not in use it can be packed into a small space, and is not damaged by packing. This article only needs to be known and tried to be appreciated.

THE "JEKMOTH" HOME STORE.

A reliable THERMOS is now an indispensable companion for every doctor, nurse, and patient, and frequently proves of service as a valuable adjunct in connection with medical researches. For all travellers, motorists, and night workers a Thermos flask must be counted a necessity. In the management of consumptive and other patients undergoing open-air treatment this scientifically designed receptacle is oftentimes of the greatest service. The firm of Thermos (1925) Ltd. is now supplying an excellent series of Thermos flasks, jugs, carafes, and food jars

THE NEW NO. 4 MODEL THERMOS WITH CAP COVER.

[1] The "Comsense" Shirt is made by Thomas Plant and Co., Ltd., 18, Colonnade, Cheltenham, and can be supplied in ceylonette, cotton taffeta, cellular material, flannel, and union taffeta, at prices ranging from 6s. to 13s. 9d. Illustrations and particulars can be provided on application.

[2] Illustrated particulars regarding the "Jekmoth" Home Store can be obtained at all leading stores or from the makers at 10, Wetherby Terrace, Old Brompton Road, South Kensington, S.W.

at inexpensive rates. For general use we would recommend the new No. 4 Hygienic Flask which is now available in sizes which range from ½ to 2 pints.[1]

THE "PATRIS" POURER, the ingenious invention of Mr. C. F. Dupère, meets a real need.[2] Hitherto it has been difficult to pour a fluid out of a vacuum flask without its dribbling over the thick lip of the flask and allowing leakage into the metal case. All these difficulties are effectively surmounted by the use of the "Patris" pourer, the chief features of which are indicated in the accompanying figure. The pourer, which is available in several sizes, when fitted into the neck of the vacuum flask enables the contents to be readily poured, without danger of spilling, into the smallest receptacle. It consists of a short double-lipped tube of specially annealed glass with a jacket and stopper of tough cork, and it fits perfectly under the metal cover of the flask and need not be removed except for cleaning. The price is 8d. each. Doctors and nurses and indeed all who use a vacuum flask will welcome this serviceable novelty.

THE "PATRIS" POURER.

METAGEN AND COD-LIVER OIL EMULSION contains 40 per cent. of the finest Norwegian cod-liver oil assayed physiologically to demonstrate the presence of a definite proportion of the fat-soluble vitamins A and D before use.[3] It is enriched by water-soluble and fat-soluble vitamins of metagen, a concentrated extract prepared from vegetable sources. The oil is emulsified by fresh eggs, and each fluid ounce is said to contain at least 12,000 fat-soluble vitamin A units, and at least 1,600 vitamin D units. The value of cod-liver oil in the treatment of tuberculosis has been attributed to its abundant supply of unsaturated fatty acids, and especially to the fact that it is a particularly rich source of the fat-soluble vitamins A and D, a feature which renders it particularly active in promoting the absorption and deposition of calcium in the tissues. In cases in which tuberculosis is accompanied by demineralization the deposit of calcium in the tuberculous foci is an essential part of the natural process of reparation. This preparation is likely to prove of great service as an auxiliary in the hygienic management of tuberculous cases. The routine administration of daily doses of the emulsion is calculated to be a valuable prophylactic in the case of tuberculously disposed children, and others who may have a predisposition to tuberculosis.

ALLONAL, or Allyl-isopropyl-barbituric Acid with Phenyl-dimethyl-dimethylamino-pyrazolon (Amidopyrine), is a hypnotic and analgesic which, although not subject to the Dangerous Drugs Act, is proving of much value in controlling pain and insomnia in a number of

[1] Particulars regarding the various forms of Thermos suitable for medical purposes can be obtained on application to Thermos (1925) Ltd , 45, Aldermanbury, E.C. 2.

[2] Further particulars regarding the "Patris" Pourer for vacuum flasks can be obtained on application to the inventor, C. F. Dupère, 11, Thornfield Road, Bishop's Stortford, Herts. A set of six assorted samples, 3s. post free.

[3] Metagen and Cod-Liver Oil Emulsion is supplied in bottles of 8 and 16 ounces by Parke, Davis and Co , Beak Street, W. 1. A specimen will be sent to physicians on request.

diseases.[1] We have received an important communication on the use of Allonal for the relief of tickling cough in tuberculosis and other conditions by Dr. Jean Louis Burckhardt, of Davos. He shows that in simple or tuberculous laryngitis the cough greatly aggravates the general state by the exhaustion, pain, insomnia, vomiting, etc., which it produces. Several methods of treating this symptom are available: rest, suggestion, hospital discipline, hot applications, moist compresses, mucilaginous and demulcent drinks, and, finally, local laryngeal anæsthetics. The most effective sedatives for cough in many cases of tuberculosis are undoubtedly preparations of opium: oftentimes they are the only effective cough sedatives available (although bromide preparations are useful in whooping-cough). These agents are disadvantageous and dangerous, and may initiate a pernicious drug habit. Allonal has proved successful as a cough sedative at Davos. One Allonal tablet corresponds approximately to the initial doses of, say, 0·01 gramme of codein or para-codein, 0·005 gramme of dicodide or eucodal, or 0·05 gramme of heroin. Sometimes two tablets are necessary, taken preferably at intervals, to obtain the desired effect. The soothing action lasts about four hours, and at night-time somewhat longer. Dr. Burckhardt states that his object in writing his paper has been to show that, as a result of practical experience of long duration, Allonal, apart from its use as an excellent analgesic and hypnotic, has also a great field of usefulness as a remedy for tickling cough. Dr. Burckhardt, from his experience with Allonal in the treatment of cough in tuberculous cases at Davos, has no hesitation in strongly recommending this new sedative.

Oatine Toilet Preparations[2] constitute a series of cosmetic and hygienic agents which greatly facilitate personal hygiene. They are of special value to patients undergoing sanatorium or open-air treatment, and desiring to resist the detrimental effects of exposure to the cold of winter and the heat of summer. Oatine Cream and Oatine Snow are ideal applications for the protection and preservation of the skin and the maintenance of a good complexion. The Oatine Soap, Talcum Powder, Tooth Paste, Shampoo Powders, and Shaving Stick provide just the toilet agents in convenient, reliable, and pleasing forms which patients, either at home or in hospital and sanatoria, will thoroughly appreciate.

Collosol Cod-Liver Oil Emulsion[3] is a 50 per cent. preparation designed to secure the most important elements of cod-liver oil—namely, the vitamin contents. The oil is obtained by expression from the livers of specially selected cod caught by British fishermen in home waters. The oil is expressed on board the trawler itself. The importance of this development in the production of cod-liver oil cannot be overestimated, and the emulsifying process is also a great advance, as it gives a product which is readily miscible with water or milk. The

[1] Specimens and particulars from the Hoffmann-La Roche Chemical Works Ltd., the "Roche" Laboratories, 51, Bowes Road, N. 13.

[2] The Oatine Company, Oatine Buildings, 4, Mermaid Court, Borough, S.E. 1, the manufacturers of the Oatine Toilet Preparations, also publish "The Oatine Book," which gives particulars regarding Oatine aids to the preservation of a beautiful complexion. A copy will be sent post free on application.

[3] Particulars regarding Collosol Cod-Liver Oil can be obtained from the makers, British Colloids, Ltd., The Crookes Laboratories, 22, Chenies Street, Tottenham Court Road, W.C. 1.

flavouring agents make the emulsion an extremely palatable product. Collosol cod-liver oil emulsion is supplied at a price which, when the oil content of 50 per cent. is borne in mind, apart from the increased efficiency it represents, must be considered a most economical form for the effective administration of cod-liver oil. We have used this emulsion with great satisfaction.

The well-known firm of chocolate manufactures A. J. Caley and Sons, Ltd., are now making a special form of Malt-Milk Chocolate which promises to be of special service as a particularly palatable confection and nutriment for tuberculous subjects.[1] Children will be sure to welcome this delicious sweetmeat. It is a carbohydrate food of high caloric value. The presence of the malt would appear to assist the digestion of the chocolate. In the making of this pleasing preparation barley malt, rich creamy milk, sugar, and cocoa beans all of the best quality are used, and the product is an unusually fine, pure, wholesome, and palatable form of chocolate with a delicious flavour.

Many tuberculous patients are confirmed cigarette smokers, and a complete withdrawal oftentimes brings about a psychological distress which is prejudicial to the general progress of the case. When dealing with such patients the best one can do is to insist on a control of quantity and quality. The well-known firm of Carreras, Ltd., are now supplying a reliable cork-tipped cigarette made of specially mild Virginian tobacco for irritable throat cases and those who have to abstain from all varieties which are likely to prove prejudicial.[2]

We are glad to receive particulars of new hygienic appliances and therapeutic preparations which are likely to prove of service in hospital and sanatorium management and in the home or institutional treatment of tuberculous cases.

[1] Particulars regarding Malt-Milk Chocolate can be obtained on application to the makers, A. J. Caley and Sons, Ltd., Norwich.

[2] Particulars regarding the mild varieties of cigarettes and tobacco can be obtained on application to Carreras Ltd., Arcadia Works, City Road, E.C. 1.

THE OUTLOOK.

THE TREATMENT OF TUBERCULOUS PATIENTS.

THE MINISTRY OF HEALTH in the spring of the present year issued Circular 771 to County and County Borough Councils and Tuberculosis Joint Committees (England) dealing with certain resolutions which were recently adopted by the County Councils Association. The circular deals with the principles on which the schemes of Local Authorities responsible for the conduct of the treatment of tuberculous patients should be conducted. The information and advice provided appears to be of such importance that we venture to reproduce the essential portions:

"*Dispensary Administration.*—The primary duties of the Tuberculosis Officer should consist in the diagnosis of cases of tuberculosis, consultations with general practitioners (with whom the Tuberculosis Officer should endeavour to become personally acquainted in order that the fullest measure of co-operation may be secured), the searching out and examination of the "contacts" of newly notified and other cases of tuberculosis, the general supervision of patients not requiring active treatment, the "following up" of patients for whose failure to continue in attendance at the dispensary no satisfactory reason has been ascertained, acting as medical adviser to any local organization for care and after-care, and the education of the general public in the need for combined effort in the eradication of the disease. In the Minister's view actual treatment at the dispensary, as distinct from diagnosis, consultation and general supervision, should, as a rule, be limited to patients whose continued treatment requires special knowledge or technical skill, or who are unable to obtain other adequate medical attendance. Patients whose treatment does not call for the exercise of experience or skill beyond that which general practitioners ordinarily possess, and who are either insured persons or are able to pay for medical attendance, should not be encouraged to attend the dispensary for routine treatment. The practice of treating patients at dispensaries on a large scale, and over prolonged periods, with bottles of medicine, codliver oil, etc., and of giving medicines to ensure the attendance of patients at the dispensary, is to be discouraged. The Minister is advised that patients should be taught to appreciate the value of personal advice and of instruction in a hygienic mode of life, instead of looking upon the taking of drugs as the necessary and only important factor in treatment. At the same time where, in the case of such tuberculous patients as receive treatment at a dispensary, the Tuberculosis Officer is of opinion that the provision of codliver oil, malt, etc., is medically desirable as part of the treatment of a patient, he should not be restricted in meeting the medical requirements of the case. As regards the granting of extra nourishment, as the Authority are aware, the expenditure on this service ranking for grant is limited to a maximum rate of £2 per annum per thousand of the population, and it is accordingly necessary that every effort should be made to ensure that the funds available are expended to the best possible advantage, and that food is supplied only

to patients who are likely to benefit materially thereby. The Minister is advised that the classes of patients likely to benefit to the greatest extent from the provision of extra nourishment are the following: (*a*) patients who have received an adequate course of sanatorium treatment and whose medical condition is such that, with the grant of extra nourishment, they may be expected to maintain or recover full working capacity; and (*b*) patients in whose cases ultimate arrest of the disease may reasonably be anticipated, and who are waiting for admission to a sanatorium. Provision should be made for inquiry into the financial circumstances of every applicant, and extra nourishment should not be supplied to patients who may reasonably be expected to incur the necessary additional expenditure from their own resources; but the Tuberculosis Officer might be empowered to grant extra nourishment for a strictly limited period, pending investigation of the financial circumstances, to a case which is, *prima facie*, suitable. On the other hand, it should be borne in mind that the expenditure by the Local Authority on the supply of additional food is not justified in the case of tuberculous persons whose circumstances are such that they can be dealt with adequately only through the machinery of the Poor Law. In areas in which a voluntary Care Committee has been established, the Authority would be well advised to seek the assistance of the Committee in determining from the economic standpoint the eligibility of applicants. It is suggested that where special treatment, such as the use of tuberculin and pneumothorax refills, is provided at a dispensary, there should be some provision for in-patient treatment readily available in case of need: and that in many areas substantial economy may be achieved by arranging for, or providing, facilities for X-ray work at some central place and avoiding the provision of a separate apparatus at each dispensary. The Minister desires to take this opportunity of bringing to the notice of the Local Authority the expediency of the periodical issue to the public generally, and also to medical men practising in the Authority's area, of information as to the location of each tuberculosis dispensary provided by the Authority, and as to the facilities available at these dispensaries. It has been represented that there is not at present a sufficiently widespread knowledge amongst the public that any person who is suffering, or who suspects himself to be suffering, from tuberculosis can, by recourse to an approved dispensary, obtain the benefit of examination and advice by specially skilled medical officers, together with the opportunity of such treatment under the Authority's scheme as may be found appropriate. The Minister is advised that, by taking suitable steps to spread the knowledge of these facilities, together with the addresses of the dispensaries through which they can be obtained, Local Authorities would do much to further the success of their tuberculosis schemes.

"*Residential Treatment of Advanced Cases.*—The Minister is advised that much importance is to be attached to the provision of residential treatment for advanced and acute cases of tuberculosis. Whilst in some advanced cases the provision of treatment at home may be free from serious objection if the home conditions are such as to obviate danger of infection to others, and in acute cases, if adequate nursing at home is feasible, removal to a residential institution is the only satisfactory course where these conditions are not present. Local Authorities should bear in mind the compulsory powers for the removal to institu-

tions of infectious cases of pulmonary tuberculosis which are conferred on them by Section 62 of the Public Health Act, 1925. In the case of patients with slowly progressive chronic pulmonary tuberculosis a short period of treatment in a residential institution is frequently of value in restoring working capacity and prolonging life. These patients also receive the benefit of training in special hygiene which is advantageous to themselves and a protection to others.

"*Treatment of Surgical Tuberculosis.*—The Minister is advised that the modern tendency is to substitute conservative treatment for the operative treatment of surgical tuberculosis, and that the treatment of tuberculous disease of the bones and joints can best be carried out at a special institution, preferably situated in the country, of sufficient size to enable the full equipment necessary for the modern treatment of the conditions to be economically provided, and having the services of a skilled surgical staff. The needful equipment and staff cannot be economically provided at a small unit attached to a sanatorium for the treatment of pulmonary tuberculosis. It should be noted that the equipment and methods of treatment requisite at a special orthopædic hospital are equally suitable for the treatment of crippling deformities due to diseases other than tuberculosis, and it may therefore usually be found advantageous that the same hospital should receive, from the area which it serves, not only cases of tuberculosis of the bones and joints under the tuberculosis schemes of Local Authorities, but also cases of crippling due to other diseases in children under five years of age from the Maternity and Child Welfare Authorities and in children of school age from the Local Education Authorities. The population and area served by an orthopædic hospital should be large enough to enable it to be run economically, and in many cases it would be desirable that the hospital should serve the areas of several Authorities.

"*Dental Treatment.*—A considerable number of Local Authorities have made arrangements, with the approval of the Minister, for the provision of dental treatment as a necessary adjunct to the effective treatment of tuberculosis in persons with defective teeth, and the Minister desires to call attention to the recent extensions in the provision of dental treatment as an additional benefit under the National Health Insurance Acts. It is not possible to give any close estimate of the number of insured persons who will be entitled to dental benefits, but probably about three-quarters of the insured population in England will be in a position to obtain from their Approved Societies a proportion at least of the cost of dental treatment which they may require. In order, therefore, that Local Authorities may not incur the cost of providing dental treatment for which provision is already made under the insurance scheme, it is important that, before expenditure is incurred on dental treatment for an insured person, he should be requested to communicate with his Approved Society and ascertain whether he is entitled to receive, as a benefit under the National Health Insurance Acts, any contribution towards the cost of his dental treatment. It should be noted, however, that these inquiries will not be necessary in the case of insured persons who are Deposit Contributors, or ordinarily in the case of those who, though members of an Approved Society, have not reached their twenty-first year, as no member of either of these groups will be in a position to receive dental benefits under the insurance scheme.

"' *Pre-tuberculous' Children.*—The Minister and the Board of Education are of opinion (in general accord with a resolution adopted by the County Councils Association on this subject) that so-called "pre-tuberculous" children, by which may be understood delicate children who, owing to family history or environment, may be thought to be predisposed to the disease, but who are not definitely diagnosed as suffering from tuberculosis and are not suspected to be actually so suffering, should be dealt with by the Local Education Authorities at Open Air Schools certified by the Board of Education under Part V. of the Education Act, 1921, and not in sanatoria provided by the Public Health Authorities conducting tuberculosis schemes. Children suspected to be definitely suffering from tuberculosis may, however, properly be admitted by the latter Authorities to observation beds in approved sanatoria or other residential institutions for periods of observation with a view to the establishment of a definite diagnosis. Such periods of observation should not be unduly long. A period of two or three weeks' observation will frequently be sufficient, and where a positive diagnosis cannot be established, the case should be discharged and revert to the supervision of the School Medical Officer, who, in the event of suspicious symptoms arising at a later date, should again refer the case to the Tuberculosis Officer for examination."

THE EMPLOYMENT OF TUBERCULOUS SUBJECTS.

We have received the following communication in the form of a letter from Dr. Jane Walker, Medical Superintendent of the East Anglian, Maltings Farm, and East Anglian Children's Sanatoria, Nayland, Colchester, as Chairman of the Wilkins Committee of the Society of Superintendents of Tuberculous Institutions, the temporary office of which is at 122, Harley Street, W. 1: "It has been felt that there is a great need for some organization to act as a connecting link between sanatorium superintendents and those convalescent from tuberculosis and other diseases of the chest who find difficulty in getting suitable work. What is really wanted is some spot of the nature of a clearing-house where people can apply for work, and where those who want workers can make enquiries; and it is proposed to supply this deficiency. We ask you to help forward this scheme by (*a*) sending to the secretary the names of any suitable patients of yours who want work, and by carefully filling in the enclosed form which is sent herewith for your consideration and comments. The scheme can only be a success if the form is completed frankly and without omissions; (*b*) agreeing to employ as many of these people as you can yourself, and to do what you can to get others to give them employment. The question whether or not equal wages should be paid to these disabled people will have to be seriously considered, and we should like your opinion on this point. We wish to state that the class of person chosen will be in many ways, such as character, superior to the average. This has been the usual experience of those who have employed ex-patients. It will be of great importance to get patrons for this Society, and to make its existence known as widely as possible. There will be a central office, possibly in Harley Street, and it is hoped to establish centres in provincial towns. It is suggested that the Society should be kept in the hands of medical people. Lists of vacant posts will be

prepared at intervals and sent to members of the Society of Superintendents and the Tuberculosis Society with the agenda. All correspondence, etc., of this extension of the activities of the S.S.T.I. will be in charge of the Wilkins Committee, named after the originator of the idea, the late Dr. A. G. Wilkins." A special application form for the Employment Bureau may be obtained on application.

NOTES AND RECORDS.

The National Association for the Prevention of Tuberculosis held its Thirteenth Annual Conference in the Great Hall of the British Medical Association House, Tavistock Square, London, W.C. 1, on June 30, July 1 and 2. The Conference was opened by the Minister of Health, the Right Hon. Neville Chamberlain, M.P. The chief subject of discussion was "Present Lines of Attack on Tuberculosis: Their Relative Values," opened by Sir John Robertson, C.M.G., Medical Officer of Health for the City of Birmingham, and Professor of Public Health in the University of Birmingham. We hope to give an account of this important conference in our next issue. A volume of *Transactions* will be issued at an early date.

A meeting of the Society of Superintendents of Tuberculosis Institutions was held on July 11, in the House of the British Medical Association, Tavistock Square, when addresses were given by two American authorities, Dr. Eugene L. Opie, of the Henry Phipps Institute, Philadelphia, who spoke on latent tuberculosis and its relation to manifest disease, and Dr. H. Longstreet Taylor, President of the National Association for the Prevention of Tuberculosis in America, who discussed sanatorium treatment in cold climates.

A new pathological laboratory and research institute for the City of London Hospital for Diseases of the Heart and Lungs, Victoria Park (the gift of the Prudential Assurance Company), will be opened on July 19, at 3 p.m., by the Rt. Hon. Neville Chamberlain, M.P., Minister of Health.

At Colindale Hospital for Tuberculous Patients, Colindale Avenue, Hendon, N.W. 9, probationers are trained. Two years' training is required for the examination of the Society of Superintendents of Tuberculosis Institutions, and qualifies for a post of staff nurse at £60 per annum. The training also counts as one year towards full general training at certain general hospitals under a scheme approved by the General Nursing Council. A salary of £34 per annum is provided, rising to £36, with board, lodging, washing and uniform. Further particulars may be obtained on application to the Matron, Colindale Hospital, Hendon, N.W. 9.

At the Lord Mayor Treloar Hospital for Crippled Children, Alton, Hants, probationers are received for training at the age of 18 years. The training is for three years, and is valuable for those intending to become fully trained nurses, but who are too young for general training. Part of the training may be given at the Seaside Branch at Hayling Island. Candidates must be well educated. Particulars may be obtained on application to the Matron.

At the Annual Meeting of the Tuberculosis Society held at Oxford in the spring the following were elected officers for the ensuing year. President: Sir StClair Thomson; Chairman of Council: Dr. Rood-

house Gloyne; Council: Dr. Gloyne, Dr. G. T. Hebert, Dr. H. Gordon Smith, Dr. A. Neville Cox, Dr. C. J. Faill, Dr. H. A. Ellis, Dr. F. R. Walters, Dr. A. Sandison, Dr. E. Ward, Dr. G. M. Mayberry, Dr. G. B. Price, and Dr. Jane Walker; Hon. Secretary: Dr. F. J. C. Blackmore; Hon. Treasurer: Dr. W. Brand. Particulars regarding the Society can be obtained on application to Dr. F. J. C. Blackmore, The Tuberculosis Dispensary, Maxey Road, Plumstead, S.E. 18.

The Council of the Royal College of Surgeons of England have announced that the subject of the Jacksonian Prize for the present year, 1927, is "The Pathology, Diagnosis, and Treatment of Bronchiectasis and Abscess of the Lung," and the subject for the year 1928 will be "The Surgical Treatment of Pulmonary Tuberculosis." Dissertations for 1927 must be delivered at the College, Lincoln's Inn Fields, W.C. 1, not later than 1 p.m. on December 31, and for the ensuing year, 1928, not later than 4 p.m. on December 31, 1928.

The last report of the Milbank Memorial Fund, 49, Wall Street, New York, contains particulars regarding the New York health demonstrations and other activities for furthering human betterment in town and country districts. The illustrations and charts are particularly instructive.

The Canadian Tuberculosis Association in its Twenty-sixth Annual Report gives details regarding the progress of the various tuberculosis agencies in the provinces of Canada. Dr. R. E. Wodehouse, O.B.E., of Ottawa, is the Secretary.

The Tuberculin Dispensary Benevolent Society, of which Dr. W. Camac Wilkinson is Chairman, has opened a Tuberculin Dispensary at 32, Fitzroy Street, W. 1.

Caravanning is now affording delightful provision for holiday-makers and health seekers. For some tuberculous and tuberculously disposed people the restful, happy, open-air life of residence in a suitably equipped caravan offers many advantages. The Holiday Caravan Co., Ltd., have issued an illustrated, descriptive, and generally informing booklet on caravanning, which we commend to the notice of medical advisers and all lovers of country life.[1]

The Faculty of Medicine of Geneva has organized a vacation course, September 5 to 30, for last-year students, comprising clinical medicine, medical jurisprudence, surgery of industrial accidents, and professional hygiene. Excursions will be made to climatological and bacteriological stations. The fee is 80 francs. Further information can be obtained from the Secretary of the University, Geneva.

An informing illustrated booklet on Radium can be obtained on application to Watson and Sons[2]

We have received from Mrs. G. Janet Bradbury, of Darenth House, Sandgate, Kent, Hon. Secretary S.P.G. Waste Medical Literature Department, a communication expressing the hope that some subscribers to THE BRITISH JOURNAL OF TUBERCULOSIS will be good enough to favour her with copies when read, so that they may be sent to members of the medical profession working abroad.

[1] "Caravanning: the Handbook of the Ideal Holiday," is published by the Holiday Caravan Co., Ltd., Bainton Road, Oxford.

[2] "Radium: its Production and Therapeutic Application." Pp. 55, with illustrations. Published by Radium Belge (Union Minière du Haut Katanga), 10, Montague du Pare, Brussels. British agents: Watson and Sons (Electro-Medical), Ltd., 43, Parker Street, Kingsway, W.C. 2.